Simulations Issue

A CWC/I PUBLICATION
JUNE 1984 USA $2.95
CAN $3.50

# HOT CoCo

THE MAGAZINE FOR TRS-80 COLOR COMPUTER® AND MC-10® USERS

## Inside an Assembly-Language Game

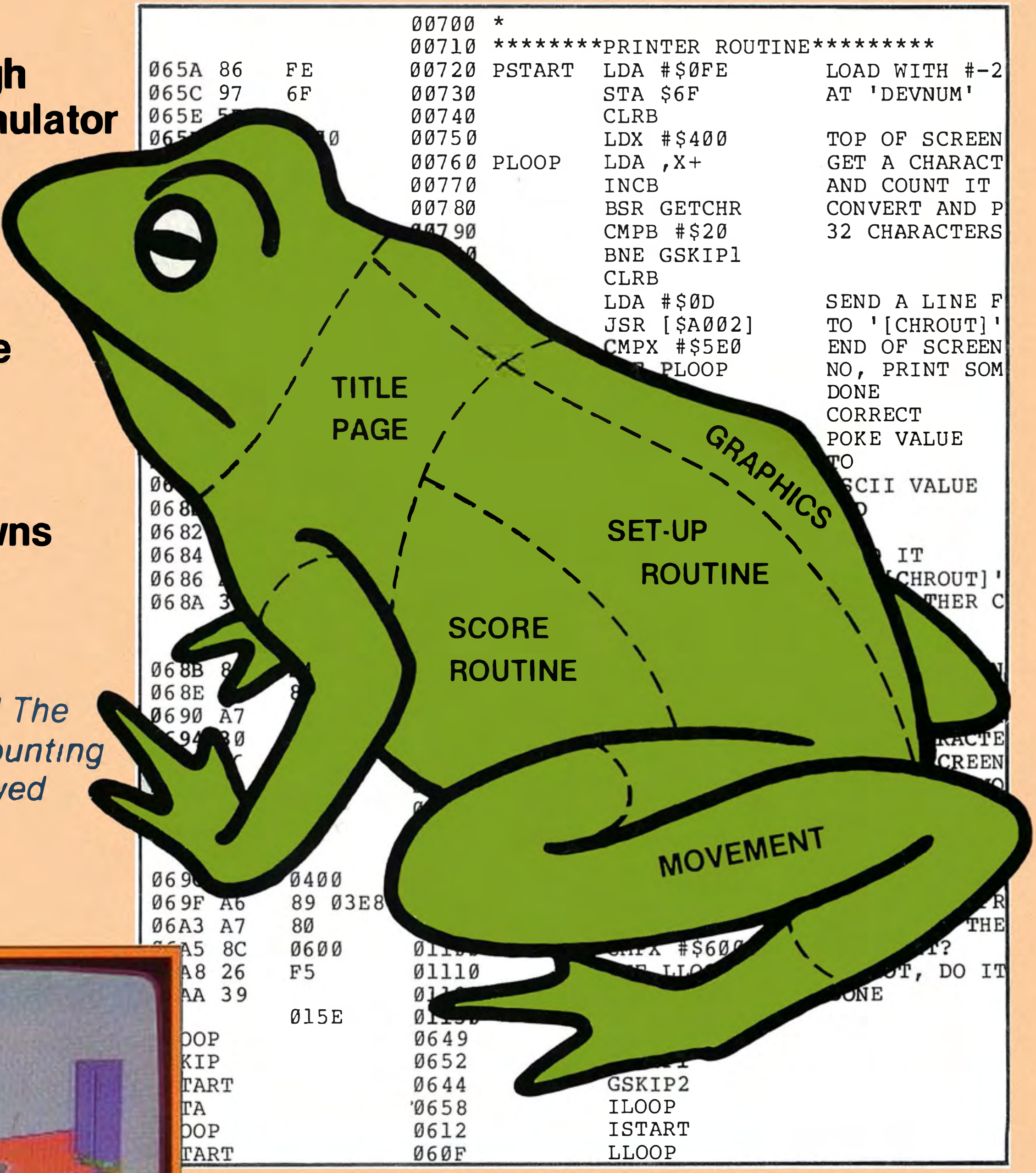
*Learn How the Pieces Work Together*

**Buy Low, Sell High
Stock Market Simulator**

**Build Your
Own Atari
Joystick Interface**

**Win (or Lose) Big
At Bringmee Downs**

*Plus: Elite-Word and The
Business Accounting
System Reviewed*



```
                         00700 *
                         00710 ********PRINTER ROUTINE*********
065A 86    FE            00720 PSTART  LDA #$0FE      LOAD WITH #-2
065C 97    6F            00730         STA $6F        AT 'DEVNUM'
                         00740         CLRB
                         00750         LDX #$400      TOP OF SCREEN
                         00760 PLOOP   LDA ,X+        GET A CHARACT
                         00770         INCB           AND COUNT IT
                         00780         BSR GETCHR     CONVERT AND P
                                       CMPB #$20      32 CHARACTERS
                                       BNE GSKIP1
                                       CLRB
                                       LDA #$0D       SEND A LINE F
                                       JSR [$A002]    TO '[CHROUT]'
                                       CMPX #$5E0     END OF SCREEN
                                                      NO, PRINT SOM
                                                      DONE
                                                      CORRECT
                                                      POKE VALUE
```

TITLE PAGE
GRAPHICS
SET-UP ROUTINE
SCORE ROUTINE
MOVEMENT

CROAKER
by Mike Meehan
©1983

**SEND FOR FREE CATALOG**

TCE™

**Dealer inquiries invited**

## ABC'S IN COLOR

In the ABC program, all 26 letters spring up in color to the familiar ABC tune. Then, colorful detailed pictures depicting each individual letter of the alphabet appear one by one. Your child's fascination will mount as he or she correctly presses the letter on the keyboard and is rewarded with a musical tune before the next detailed picture is drawn line by line onto the screen: AIRPLANE for A, BUS for B, CLOWN for C and so on to ZEBRA for Z. Truly a must program for the preschool to first grade age group!

CoCo 16K ECB . . . . . . Tape: $19.95 Disk: $25.95

## CRISS—CROSS MATH

As the program begins, your child is presented with a nine square playing board. It is your choice as to which square you choose. After a choice is made, a MATH PROBLEM appears in the square. You score your first X by answering the problem correctly. If your answer is incorrect, the square clears and your opponent is allowed his choice of squares. The game is over when three squares vertically, horizontally, or diagonally are won by the same player. When playing against the computer, every answer you get wrong is won by the computer. Multi-level ADDITION AND SUBTRACTION program.

CoCo 16K . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Tape: $12.95

## FRACTIONS

SIDE ONE: Fraction Lessons, explains fractions with the aid of graphics. Child studies the different ways fractions can be represented. Lessons include:

IMPROPER FRACTIONS
MIXED FRACTIONS
PROPER FRACTIONS

Many educators have praised the use of motion and color to display the fractional equivalents.

SIDE TWO: Fraction practice, offers a random computer generated quiz.

Atari 16k . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Tape: $19.95
CoCo 16k . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Tape: $19.95

## JOYSTICK DRAW

Joystick Draw is the simple way to explore your artistic talents! Program operation is easy enough for a child to use, but effective enough that TCE uses it to design many sophisticated high-resolution graphic screens. Joystick Draw's design allows you or your child to save those masterpieces for future revisions or for use in other programs (instructions included). Your child will spend many hours enjoying this program and at the same time improving his or her eye hand coordination! You will find Joystick Draw to be an easy way to design those more sophisticated graphics for your own programs!

CoCo 16 ECB . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Tape: $16.95

## SPELL BOMBER

As captain of your ship, you must destroy the enemy bomber by spelling the mystery word. In this exciting and educational game the bomber gets closer with each inaccurate letter. You have only EIGHT tries to guess the mystery word or your ship will be bombed! If you guess the word correctly, GENERAL QUARTERS will sound and your ship will fire a missile to destroy the bomber. Three levels are available: EASY, MEDIUM, and HARD. Challenging for all ages!

Atari 16K . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Tape: $18.95
CoCo 16k ECB . . . . . . . . . . . . . . . . . . . . . . . . . Tape: $18.95 Disk: $22.95
Vic 20 13k . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Tape: $18.95

## SPELLING BEE

The word is pronounced vocally and it is up to you to type in the correct spelling. If wrong, the computer will be your friend and flash the word on the screen for just an instant. OK! Try typing the word in again. STILL WRONG! The computer wants success and allows you to see the word again this time a little longer. If you just can't spell the word, the computer realizes you need to learn to spell the word and leaves the word on the screen for you to copy. Try your best and the computer has a surprise for your reward!

SPELLING BEE I . . . GRADE 1 & 2 SPELLING BEE III . . . GRADE 5 & 6
SPELLING BEE II . . GRADE 3 & 4 SPELLING BEE IV . . GRADE 7 & 8

CoCo 16k ECB . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . TAPE: $16.95 Each

## TC—INVENTORY

Many insurance companies offer a discount for policy holders which have complete inventories on file. TC — Inventory is designed to help you organize, maintain, and compile the personal belongings of your home. Program is user friendly and menu driven. TC — Inventory allows input for location of item, price of item, serial number of item, date of purchase, and a text written description of the item. Don't put off recording your personal belongings until its too late. Requires printer for hard copy.

CoCo 32k ECB . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . Tape: $16.95

## TEACHING CLOCK

Torn between teaching time on a digital or a conventional (face and hands) clock? Well, this program combines the two using high resolution graphics and prompts! Your child will learn to tell time with the aid of a specially designed CLOCK! Child enters the time, if wrong, the center of the clock displays a graphic aid. If the child is correct a musical reward is heard. Program offers three levels: hours, quarter hours, and five minute intervals.

Apple 48k . . . . . . . . . . . . . . . . . . . . . . . Disk: $19.95
Atari 32k . . . . . . . . . . . . . . . . . . . . . . . Tape: $16.95
CoCo 16k ECB . . . . Disk: $19.95 Tape: $16.95

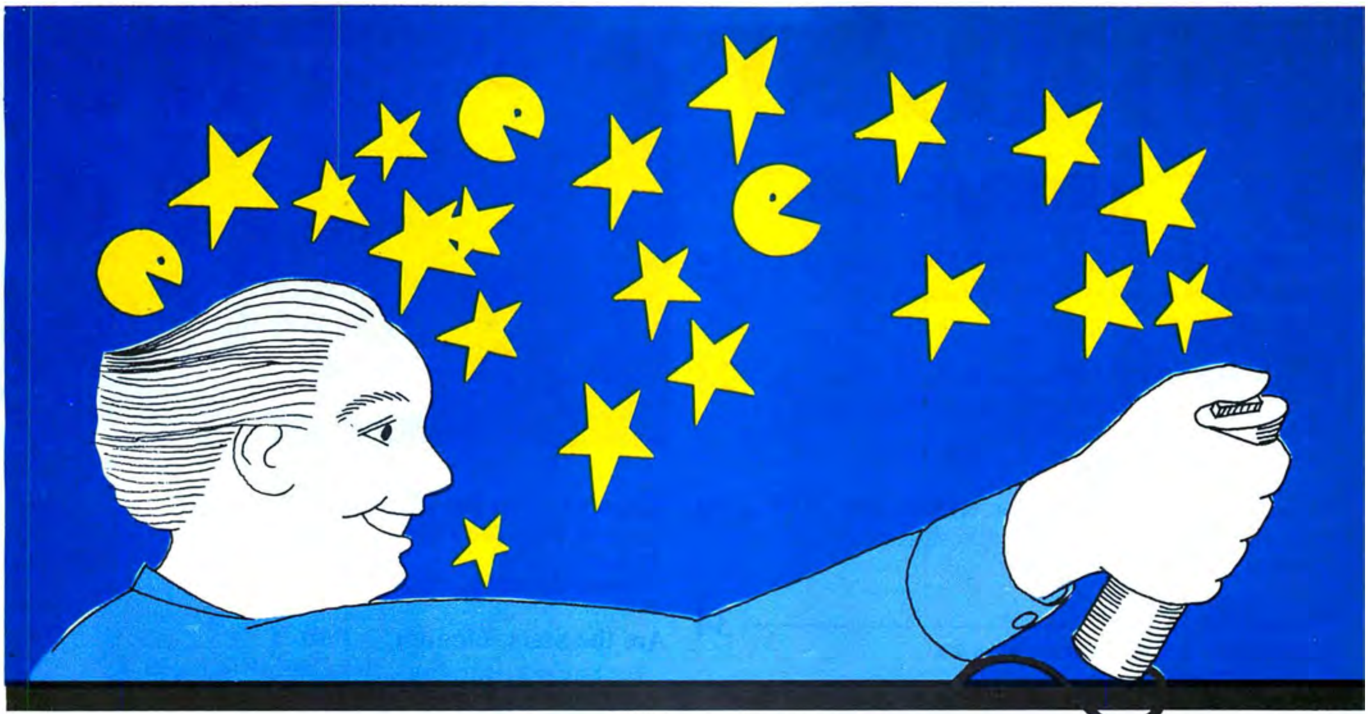
MasterCard

**Additional Educational Software available for Color Computer, TDP 100, Atari®, Apple®, Commodore 64®, and VIC 20®.**

VISA

390

P.O. Box 2477 Gaithersburg, Maryland 20879 (301) 963-3848



# The Joystick that sets you free!

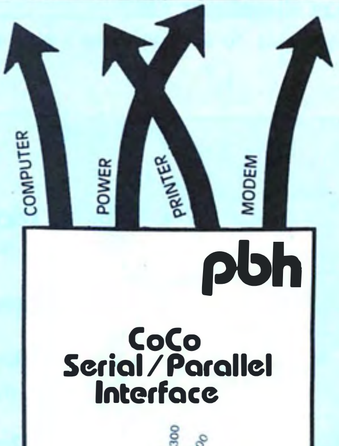
The one-hand operation of this fantastic new joystick will truly set you free and increase the pleasure of playing your favorite video games. The smoothness and responsiveness of this unique joystick that operates completely without a base is something to be experienced. Available direct from us or from your independent computer retail store. (See below)

**$49.95** suggested retail

**STOP** changing Printer and Modem Cables! Our **Parallel Printer Interface** provides **Switch Selectable Printer** or **Modem** operations for both CoCo and MC10. It features switchable baud rates from 300 to 9600. It comes complete with power supply, modem cable and **"Centronics"** type printer cable. For Basic 1.1 and later revisions.

Available direct from us or from your independent computer retail store. (See below)

**Only $89.95** suggested retail



**pbh Computer Products, Inc.**
P. O. Drawer 55868
Houston, Texas 77055
713/956-0207

20

When ordering direct from **PBH** please enclose $3.00 per item for shipping.

**Stocking Distributors**

Compukit
Houston, TX. 77059

Spectrum Projects
Woodhaven, N.Y. 11421

**Authorized Dealers**

Endicott Computer
Software & Accessories
Huntsville, AL. 35801

The Computer Store
Jasper, IN. 47456

The Software Connection
Ft. Lauderdale, FL. 33319

Colorware, Inc.
Woodhaven, N.Y. 11421

TRS TECH
Computer Services
Houston, TX. 77033

Computers & More
Huntsville, TX. 77340

The Photo Shop Radio Shack
Wilmar, MN. 56201

Patterson Electronics
Mountain View, AR. 72560

Computers, Etc.
Austin, TX. 78745

Cinsoft
Cincinnati, OH. 45237

EDC Industries
Los Angeles, CA. 90042

Sound Center Radio Shack
Whiterock N.M. 87644
& Los Alamos, N.M. 87544

Chips, Incorporated
Atlanta, GA. 30340

Computer Associates
West Fargo, N.Dak. 58078

Computer Plus, Inc.
Littleton, MA. 01460

Turtle Micro Ware
East Lime, CT. 06333

# HOT CoCo

## ARTICLES

**The (Word-Processing) Power Elite** — 22
Elite-Word shows off some impressive features.
*Stuart Hawkinson*

**It's All Accounted For** — 24
Mark Data's Business Accounting System shows that the CoCo isn't just a home computer.
*Steve Brown*

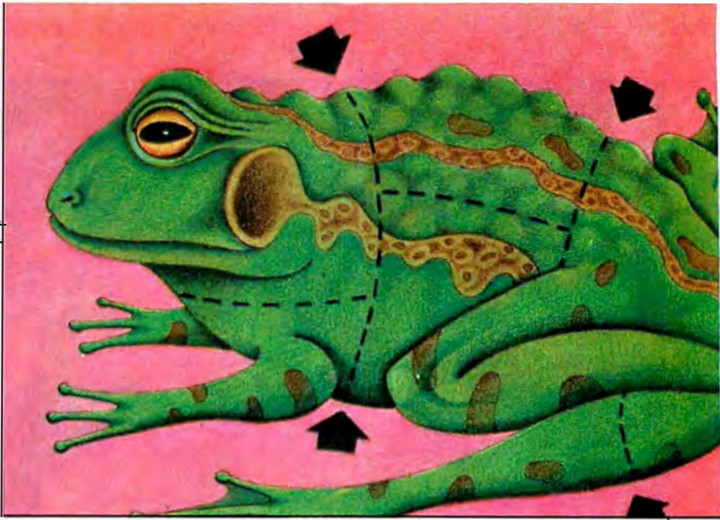
**Journey to the Center of the ROM—Part VIII** — 28
Every little bit of your Color Basic ROM exposed.
*Mark D. Goodwin*

**Wacko** — 34
Learning numbers and fractions can be fun.
*Thomas Revitte*

**Anatomy of an Assembly-Language Game—Part I** — 43
Find out what makes those arcade games tick in this six-part series.
*Mike Meehan*

**Racetrack** — 50
What would you do with your own stable of race horses?
*Glen Tapanila*

**Stock Market Simulator** — 58
How well might you do in Wall Street's bear and bull markets?
*Gary Wick*



*Anatomy of an Assembly-Language Game—p. 43*

**Airport Controller** — 66
Can you safely land a dozen jumbo jets? How about two dozen?
*Robert Ainscough*

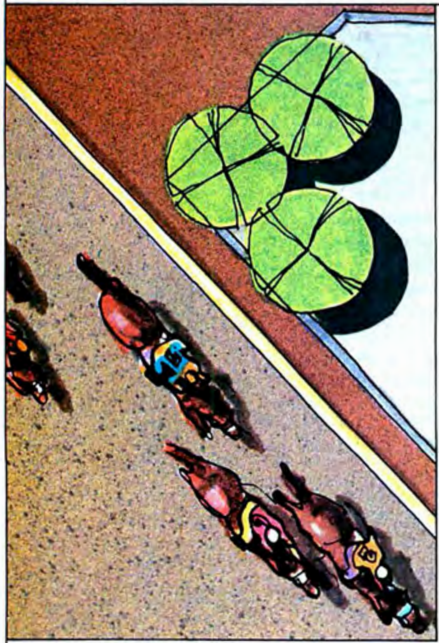
**Are the Stars Random?—Part II** — 75
You have some interesting statistical analysis techniques to use on your Color Computer.
*Philip McLaughlin*

**Atari Joystick Interface** — 82
Reap the benefits of this popular peripheral with this easy project.
*James J. Barbarello*

**Spelling Editor** — 88
Use this program with the Spelling Verifier program from last month to keep your word files up to date.
*Bob Jack*

**This symbol indicates the program's placement on the Instant CoCo loader, available on cassette. See our Instant CoCo ad for details.**

**Cover art by Diane Ritson**



*Racetrack—p. 50*

## DEPARTMENTS

**Digressions** — 6
*Michael E. Nadeau*

**Feedback** — 8

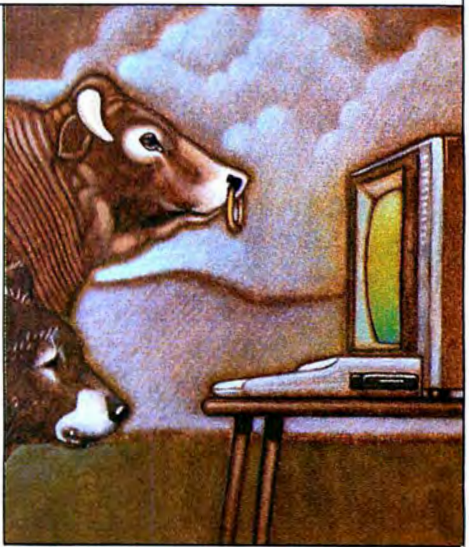
**Elmer's Arcade** — 17
*Richard Ramella*

**The Educated Guest** — 92
*Charles H. Santee*

**Reader's Forum** — 96

**Doctor ASCII** — 100
*Richard E. Esposito*

**Reviews** — 104
Filmastr, Pro-Color-File Enhanced, Compac for the MC-10, Business Manager, and more.
*edited by Mark E. Reynolds*



*Stock Market Simulator—p. 58*

**Product News** — 112
*edited by Cynthia Smith*

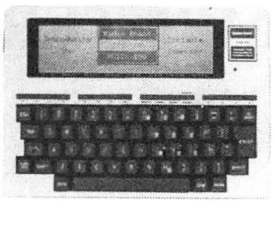
**Vol. 2 No. 1 June 1984**

*HOT CoCo* (ISSN 0740-3186) is published 12 times a year by Wayne Green Inc., 80 Pine St., Peterborough, NH, and additional mailing offices. Subscription rates in U.S. are $24.95 for one year, $38 for two years, and $53 for three years. In Canada and Mexico, $27.97—one year only, U.S. funds. Nationally distributed by International Circulation Distributors. Foreign subscriptions (surface mail), $44.97—one year only, U.S. funds drawn on a U.S. bank. Foreign subscriptions (air mail), please inquire. In South Africa contact *HOT CoCo*, P.O. Box 782815, Sandton, South Africa 2146. **All subscription correspondence should be addressed to *HOT CoCo*, Subscription Department, P.O. Box 975, Farmingdale, NY 11737. Please include your address label with any correspondence.** Postmaster: Send address changes to *HOT CoCo*, Subscription Services, P.O. Box 975, Farmingdale, NY 11737.

Entire contents copyright 1983 by Wayne Green Inc.

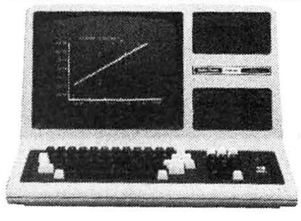
*From Computer Plus to YOU . . .*

# PLUS *after* PLUS *after* PLUS

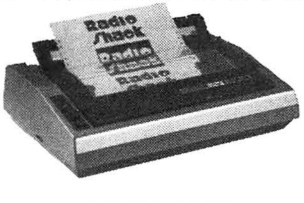


**Model 100 8K $679**
**Model 100 24K $835**

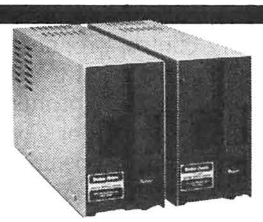
**Color Computer II 16K $135**
**w/16K Ext. Basic $165**
**w/64K Ext. Basic $210**



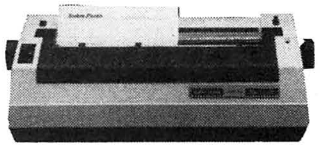
**Model 4 16K $849**
**Model 4 64K**
**2 Disk & RS232 $1699**



**DMP120 $395**
**DMP200 $520**



**Color Computer Disk Drive**
**Drive 0 $329 Drive 1 $235**



**DWP210 $629**

## BIG SAVINGS ON A FULL COMPLEMENT OF RADIO SHACK COMPUTER PRODUCTS

| **COMPUTERS** | |
|---|---|
| Model 4 Portable 64K w/2 Drives | 1525 |
| Model 2000 2Dr | 2299 |
| Model 12 1 Drive | 2360 |
| Model 16B 1Dr 256K | 3965 |
| **MODEMS** | |
| Hayes Smartmodem II | 225 |
| AC-3 | 129 |
| DC Modem I | 89 |
| DC Modem II | 160 |
| **PRINTERS** | |
| Silver Reed EXP500 D.W. Ser. | 455 |
| Silver Reed EXP550 D.W. Par. | 525 |
| CGP115 | 159 |
| CGP220 Ink Jet | 545 |
| DMP110 | 305 |
| DMP420 | 735 |
| Toshiba 1340 (24 wire head) | 779 |
| Gemini 10X | 289 |
| Gemini 15X | 409 |
| CITOH Prowriter | 359 |
| Okidata | CALL |
| Epson | CALL |

| **ETC.** | |
|---|---|
| Disk Drive Controller | 139 |
| Extended Basic Kit | 39.95 |
| PBH Ser/Par Conv. | 69 |
| 64K Ram Chips | 62.95 |
| Deluxe Keyboard | 35.95 |
| Superpro Keyboard | 69.95 |
| HJL Keyboard | 79.95 |
| CCR-81 Recorder | 52 |
| Deluxe Joystick (each) | 35.95 |
| Joysticks (pair) | 22 |
| Video Plus (monitor adapter) | 24.95 |
| Video Plus IIC | 39.95 |
| Amdek Color 1+ Monitor | 299 |
| BMC Color Monitor | 255 |
| BMC Green Monochrome Monitor | 99 |
| Taxan Green Mono. Monitor | 130 |
| Taxam Amber Mono. Monitor | 139 |
| **SOFTWARE** | (Tape Version) |
| Zaxxon | 34.95 |
| The King | 26.95 |
| Trap Fall | 27.95 |
| Buzzard Bait | 27.95 |
| Devil Assault | 27.95 |
| Colorpede | 29.95 |
| Juniors Revenge | 28.95 |
| Pac Attack | 24.95 |
| Block Head | 26.95 |
| Froggie | 24.95 |
| Lunar Rover Patrol | 24.95 |
| Lancer | 24.95 |
| Typing Tutor | 23.95 |
| Galagon | 24.95 |
| Scott Adams Adventures | 19.95 |
| Sea Dragon | 34.95 |
| Colorcome | 49.95 |
| Telewriter 64 | 49.95 |
| O-Pak (disk) | 34.95 |
| Key-264K | 39.95 |
| Elite-Calc | 59.95 |
| VIP Writer | 59.95 |
| VIP Calc | 59.95 |
| VIP Terminal | 49.95 |
| VIP Database (disk) | 59.95 |

Order any 2 software pieces listed and take 10% off their listed price. All Radio Shack software 10% off list. Send for complete list.

## CALL TOLL FREE
## 1-800-343-8124

- *LOWEST POSSIBLE PRICES*
- *BEST POSSIBLE WARRANTY*
- *KNOWLEDGEABLE SALES STAFF*
- *TIMELY DELIVERY*
- *SHOPPING CONVENIENCE*

VISA AMERICAN EXPRESS MasterCard

# computer plus

P.O. Box 1094
480 King Street
Littleton, MA 01460

**SINCE 1973**

**IN MASSACHUSETTS CALL (617) 486-3193**

✓18

TRS-80 is a registered trademark of Tandy Corp.

HOT CoCo

EDITOR-IN-CHIEF
Michael E. Nadeau
MANAGING EDITOR
Janet Fiderio
REVIEW EDITOR
Mark E. Reynolds
NEW PRODUCTS EDITOR
Cynthia Smith
TECHNICAL EDITORS
Peter Paplaskas,
Guier Wright,
Amee Eisenberg (Instant CoCo)
EDITORIAL DESIGN MANAGER
Susan Gross
EDITORIAL DESIGNER
Susan Hays
LAYOUT EDITORS
Joan Ahern, Philip Geraci,
Maurelle Godoy, Judy Oliver,
Phyllis Pittet, Glenn Suokko
PROOFREADERS
Peter Bjornsen,
Harold Bjornsen,
Robin Florence
RESEARCH ASSISTANT
Celeste Wrenn

PUBLISHER/EDITOR
Wayne Green
VICE PRESIDENT/
GENERAL MANAGER
Debra Wetherbee
VICE PRESIDENT/FINANCE
Roger Murphy
EDITORIAL MANAGER
Jeffrey DeTray
ASSISTANT TO PRESIDENT
Matt Smith
ASSISTANT TO VP/FINANCE
Dominique Smith
DIRECTOR OF MARKETING
AND SALES
David Schissler
CIRCULATION DIRECTOR
William P. Howard
603-924-9471
ASSISTANT CIRCULATION
MANAGER
Frank S. Smith
BULK & NEWSSTAND
SALES MANAGER
Ginnie Boudrieau
1-800-343-0728
ADVERTISING, 603-924-7138
Director: Stephen Twombly
Sales Representatives: Raino E. Wirein,
Barbara Alvarez
Ad Coordinator: Suzanne DesRochers
PUBLIC RELATIONS
Jim Leonard

# DIGRESSIONS

## SMALL COMPUTER BIG ON BUSINESS

I've noticed an encouraging trend recently: People are putting their Color Computers to work. I am referring to an increased interest in business and financial applications software, not program development and personal productivity.

If you've paid attention to the ads in this and other publications, you've seen a number of new products: CP/M cards, business accounting packages, inventory control programs, stock portfolio management software, and an 80-column card (vital to serious spreadsheet analysis). Many of the companies producing these products have been around for a while, and they have a good feel for the Color Computer market's direction.

So why is this happening now and not two or three years ago? I have a few hunches. First, the general public is taking lower-end computers more seriously. Millions of under-$1,000 machines have been sold, many to businessmen experimenting with the idea of getting a "full-blown" system someday.

A lot of those businessmen found that they could get along just fine with their "home" computer. Those who bought Color Computers had additional incentives to hold onto them: a convenient source of peripherals, software, and service at the local Radio Shack—very important to the guy with a growing business and no time to wait for repairs.

Second, third-party support for the Color Computer has produced products that opened the door to more serious business software development. The most important is the replacement keyboard. Not only do the improved keyboards make the Color Computer easier to use, they also give it a more professional appearance.

The pioneers who brought Flex to the Color Computer deserve credit, too. The implementation of this mainframe system on the Color Computer gives the machine credibility to users with serious applications in mind. Flex also gives Color Computer users a powerful library of business and financial software. Flex and the software it made available encourages developers to write comparable software for use with RS-DOS.

Third, the number of users with 64K, disk drives, and printers has grown to an extent where it is feasible for third-party vendors to develop software suitable for a "full-strength" Color Computer. No one will invest thousands of dollars in a sophisticated package unless a reasonably large base of computers can use it.

Finally, there are those few long-time users who blazed a trail for the Color Computer in the business world. These people wrote their own software because none was available. They experimented with graphs, equations, and hardware configurations, while their colleagues chuckled and spent money on Apples and PCs. These users proved that the Color Computer could perform admirably in a business environment.

I don't think the Color Computer poses a serious threat to IBM's domain, but many people are buying $5,000 computers for tasks that $1,500 worth of Color Computer hardware and software can handle. I predict you'll see more Color Computers in the hands of executives and professionals as the business world becomes more educated about microcomputers.

In the meantime, what's still missing? Is a true relational database manager feasible in 64K? How about some integrated software similar to Lotus 1-2-3? Come on, guys. We've made our point that the Color Computer is a serious machine. Now let's show them what it can really do.—*M.N.* ■

PRODUCTION
Director: Nancy Salmon;
Lahri Bond, Cindy Boucher,
Linda Drew, Donna Hartwell,
Laurie Jennison, Star Kachadoorian,
Marlene Mowbray, Kenneth Sutcliffe,
Leslie Walden, Theresa Verville,
Robert M. Villeneuve, Lynne Simonson
Ad Coordinators: Patricia Bradley, Paula
Ramsey; Assistant: Jean Southworth
Advertising Production: Fiona Davies,
Bruce Hedin, Michael Ford, Jane Preston
CHIEF COPYWRITER
Steve Tripp
HOT CoCo, Louis Marini
PHOTOGRAPHY
Supervisor: Nathaniel Haynes;
Sandra Dukette, Laurie Gardos,
Jeanne Quickmire, Sturdy Thomas
TYPESETTING
Supervisor: Dennis Christensen;
Darlene Bailey, Marie Barker, Prem
Gongaju, Lynn Haines, Cynthia
Letourneau, Kimberly Nadeau,
Debbie Nutting, Lindy Palmisano,
Heidi N. Thomas
DESIGN
Manager: Joyce Pillarella;
Design Consultant: Dion Owens
CREATIVE DIRECTOR
Christine Destrempes

**The left bracket,** [, replaces the up arrow used by Radio Shack to indicate exponentiation on our printouts When entering programs published in *HOT CoCo*, you should make this change.

**Article submissions** from our readers are welcomed and encouraged. Inquiries should be addressed to: *HOT CoCo* Submissions Editor, 80 Pine Street, Peterborough, NH 03458. Include an SASE for a copy of our writer's guidelines. Payment for accepted articles is made at a rate of approximately $50 per printed page; all rights are purchased. Authors of reviews should contact the *HOT CoCo* Review Editor, 80 Pine Street, Peterborough, NH 03458.

**Subscriptions:**

**Problems with Subscriptions:** Send a description of the problem and your current and/or most recent address to: *HOT CoCo*, Subscription Department, P.O. Box 975, Farmingdale, NY 11737.

**Change of Address:** Send old label or copy of old address and new address to: *HOT CoCo*, P.O. Box 975, Farmingdale, NY 11737. Please give eight weeks advance notice.

**Dealers:** Contact Ginnie Boudrieau, Bulk Sales Manager, *HOT CoCo*, Pine St., Peterborough, NH 03458. (800) 343-0728.

**Problems with Advertisers:** Send a description of the problem and your current address to: Magazine, Rt. 101 & Elm Street, Peterborough, NH 03458. ATTN.: Rita B. Rivard, Customer Service Manager. If urgent, call 1-800-441-4403.

*HOT CoCo* is a member of the CW Communications/Inc. group, the world's largest publisher of computer-related information. The group publishes 44 computer publications in 18 major countries. Nine million people read one or more of the group's publications each month. Members of the publication group include: Australia: *Australasian Computerworld, Micro Magazine*; Argentina: *Computerworld/Argentina*; Brazil: *DataNews, MicroMundo*; Denmark: *Computerworld/Danmark, MikroData*; France: *Le Monde Informatique*; Germany: *ComputerWoche, MicroComputerWelt, PC-Welt*; Italy: *Computerworld Italia*; Japan: *Computerworld Japan, PC Japan*; Mexico: *Computerworld/Mexico*; Norway: *Computerworld Norge, MikroData*; People's Republic of China: *China Computerworld*; Saudi Arabia: *Saudi Computerworld*; Spain: *Computerworld/Espana, MicroSistemas*; Sweden: *ComputerSweden, MikroDatorn, Min Hemdator*; United Kingdom: *Computer Management, Computer Business Europe*; United States: *Computerworld, HOT CoCo, inCider, InfoWorld, Micro MarketWorld, Microcomputing, PC World, 80 Micro, RUN,* and *jr.*

# Instant CoCo

*Instant CoCo Directory—June*

**SIDE A**

| ARTICLE NAME/AUTHOR | FILE | PAGE # | SYSTEM |
|---|---|---|---|
| Copyright Statement | TITLE | --- | All |
| Wacko/Revitte<br>PCLEAR I <enter> before loading on a 16K ext. machine. | WACKO | 34 | 16K |
| Anatomy of an Assembly-Language Game—Part I/Meehan | CROAKER1 | 43 | 32K Ext |
| Racetrack/Tapanila | HORSE | 50 | 32K Ext |
| Stock Market Simulator/Wick | STOCKSIM | 58 | 16K Ext |
| Airport Controller/Ainscough | AIRPORT | 66 | 32K Ext |

**SIDE B**

| ARTICLE NAME/AUTHOR | FILE | PAGE # | SYSTEM |
|---|---|---|---|
| Spelling Editor/Jack<br>Use with SVP from last month. | SVPEDT | 88 | 32K Disk |
| Educated Guest/Santee | QUIZ | 92 | 16K Ext |
|  | RETRIEVE | 92 | 16K Ext |
| Elmer's Arcade/Ramella | KNOSSOS | 17 | 16K Ext |

The symbol (m) in the Article Name column indicates the program is machine-language and must be loaded using the CLOADM command. Additional preparatory commands are listed under the article name where appropriate. CSAVEM addresses are listed for your use with the machine-language programs.

# If Our Programs Don't Work

Having trouble entering our listings from the magazine? Here are a few tips that might help.

First, we print all our Basic listings in the CoCo's 32-column format. This means that each line should appear the same on the screen as it does in the magazine. If a line on your screen does not match the same line in the magazine, reread what you typed; you might have made an error.

Second, make sure the program is for your computer. Read the System Requirements box. The information in this box represents the minimum system configuration needed to run that particular program. Also, read the article thoroughly before typing in the program. Sometimes the article contains instructions vital to making the typed-in listing work. For instance, some CoCos will not accept the high-speed POKE (POKE 65495,0). The article for a program using this POKE will tell you to change those POKEs to 65494,0 if your computer will not work at the faster speed.

Some CoCos are sensitive to spacing in the program lines. Occasionally a computer will read a line such as FORR = 1TO20 incorrectly, interpreting the FOR not as a keyword, but as a variable. If you've removed spaces from a program listing to save space, and that program will not work, reinsert those spaces.

If everything is okay so far, check the published listing with what you've typed. Common typing errors include confusing a zero with the letter O, a one with the letter I, or a colon with a semicolon. DATA statements are particularly tricky because of the long lists of numbers. Be very careful with these.

Anyone who owns the new CoCos with the 1.2 ROMs, have noticed poor keyboard response in some published programs. To solve this, you can insert this line: FOR Z = 1TO4:POKE340 + Z,255:NEXT after any line that makes reference to PEEK 338–345. This loop will slow down a Basic program. Another way is to directly insert a POKE xxx,255, where xxx is any keyboard location between 338 and 345. Example: IF PEEK(341) = 251 THEN Y = Y − 1. Change to: IF PEEK(341) = 251 THEN POKE341,255:Y = Y − 1.

Assembly listings usually require an editor/assembler to enter them into your CoCo. The two most common editor/assemblers are Radio Shack's EDTASM + and The Micro Works' SDS80C. An Assembly listing assembled using the SDS80C will probably not run under EDTASM +.

If all the above fails, send us a printout or a detailed description of the problem you experience along with any error messages. We'll try to work it out for you. We cannot help you if you have modified the original program in any way. ■

# Feedback

## "Video Van Gogh" Corrections

The "Video Van Gogh" program (*HOT CoCo*, March 1984, p. 94) contains a mistake. Line 10 in the program should read: 10 C$ = "↑***QW AS** LCPOD-.JKFBGR?MN ".

There was also another error. Before running or saving the program, type: PCLEAR4:POKE7690,10:POKE 7691,8:POKE7692,9:POKE7697,12: POKE7698,13. The published version showed a semicolon instead of a colon after one of the POKEs. If you were having trouble with this program, these corrections should help.

*Eric Einem*
*Granada Hills, CA*

## "Video Van Gogh" Fix

Here's a fix for the "Video Van Gogh" program (*HOT CoCo*, March 1984, p. 94). Change line 10 to the following and forget the POKEs:

```
10   C$ = "↑" + CHR$(10) + CHR$(8) + CHR$(9)
+ "QWAS" + CHR$(12) + CHR$(13) + "    LC
POD-.JKFBGR?MN<>"
```

*Ronald K. Lee*
*Marrero, LA*

## Faster "Attacker" Score

Matt Togliatti squeezed all the speed he could into his "Attacker" (*HOT CoCo*, October 1983, p. 92), but the following changes will speed up the score-printing routine:

```
9 DIMH$(9),
11 FORZ = 0TO9:READH$(Z):NEXT
340 COLOR4:D = 150:U = SS:I = INT(U/
1000):U = U - I*1000:GOSUB380:D = 160:
I = INT(U/100):U = U - I*100:GOSUB380:D
= 170:I = INT(U/10):U = U - I*10:GOSUB
380:D = 180:I = U:GOSUB380:IFHH = 1
THEN90ELSE150
380 PUT(D,I) - (D + 8,11),C,PSET:DRAW
"BM" + STR$(D) + "1" + H$(I):RETURN
```

Delete lines 350–370.

*Robert Benson*
*Niceville, FL*

## Full 64K

I get your magazine each month because I think it's the best software buy going for the CoCo.

I have a tape-based, 64K, Extended Color Basic Color Computer 2. It's my third (and probably last) computer, and I use it primarily to develop application software.

I would like to see some programs that use the full potential of a 64K machine. Half of our user's group have 64K upgrades, and I'm sure the percentage is growing everywhere.

*Gary R. Hawkins*
*Weyerhaeuser, WI*

## Buyer's Guide Update

We inadvertently left out two items in our April "Peripherals Buyer's Guide." They are as follows:

Saturn Electronics' SPLC-1 Lower Case gives true lowercase letters without soldering or cutting. It is compatible with all versions of the Color Computer except the Color Computer 2. An added feature gives you inverse video at the flip of a switch. The SPLC-1 comes fully assembled and tested. It costs $59.95 and is guaranteed for 90 days. For further information contact Saturn Electronics Co. Inc., 62 Commerce Drive, Farmingdale, NY 11735, 516-249-3388.

E.A.P. Co. offers Gold Plug 80, gold-plated edge connectors that you solder over the CoCo's existing tin-plated ones. The gold connectors ensure corrosion-free contacts and reliable operation. The disk-module package costs $16.95, the disk-drive package $7.95, the two-drive disk cable $29.95, and the four-drive cable $39.95. Contact E.A.P. Co., P.O. Box 14, Keller, TX 76248, 817-498-4242, for further information.

## "Possum Run" Runs

I've received several letters from people who have had trouble with "Possum Run" (*HOT CoCo*, March 1984, p. 50), but I've checked the listing and found no mistakes. If others are having trouble, please check lines 90–92, 300–508, and 5000–5505 for typos, because most people have made errors here.

If you've checked those lines and still have a problem, please send me an SASE, a description of the trouble, the lines in which the problem occurs, and, if you have a printer, a listing of the program as you've entered it into your computer.

I've also found that you can delete lines 990–999 and 6000–6020. And, in line 325, change the first numeral to 160 (so it will read IF ZX>160...).

*Nick Bradbury*
*10500 Sandpiper Lane*
*Knoxville, TN 37922*

## F Board ≠ 64K

For the second month in a row, I disagree with the advice given in "Dr. ASCII." Twice in the March issue, Mr. Esposito states that *all* 32K Extended Color Basic Color Computers with the F board are really 64K models (*HOT CoCo*, pp. 135, 136). Unfortunately, such is not the case.

I purchased my CoCo by mail in August 1982. It was one of the first that had a case that was more silver and less black and had the nameplate in the center and no RAM button. Before I could access 64K, I had to have a $30 upgrade from Radio Shack.

A friend who bought his 32K Extended Basic CoCo about two months after I did found that his unit already had the 64K capability with no modification. Therefore, *most* 32K Extended Color Basic machines with F boards are 64K. The earliest ones will need modification.

The Computer Centers have a short test program that will tell you which

Continued on p. 12

# The HJL-57 Keyboard

# Compare it with the rest. Then, buy the best.

If you've been thinking about spending good money on a new keyboard for your Color Computer, why not get a good keyboard for your money?

Designed from scratch, the HJL-57 Professional Keyboard is built to unlock ALL the potential performance of your Color Computer. Now, you can do real word processing and sail through lengthy listings...with maximum speed; minimum errors.

At $79.95, the HJL-57 is reasonably priced, but you can find other CoCo keyboards for a few dollars less. So, before you buy, we suggest that you compare.

**Compare Design.**

The ergonomically-superior HJL-57 has sculptured, low profile keycaps; and the three-color layout is identical to the original CoCo keyboard.

**Compare Construction.**

The HJL-57 has a rigidized aluminum baseplate for solid, no-flex mounting. Switch contacts are rated for 100 million cycles minimum, and covered by a spill-proof membrane.

**Compare Performance.**

Offering more than full-travel, bounce-proof keyswitches, the HJL-57 has RFI/EMI shielding that eliminates irritating noise on displays; and four user-definable function keys (one latchable), specially-positioned to avoid inadvertent actuation.

**Free Function Key Program**

Your HJL-57 kit includes usage instructions and decimal codes produced by the function keys, plus a free sample program that defines the function keys as follows: F1 = Screen dump to printer. F2 = Repeat key (latching). F3 = Lower case upper case flip (if you have lower case capability). F4 = Control key; subtracts 64 from the ASCII value of any key pressed. Runs on disc or tape; extended or standard Basic.

**Compare Installation.**

Carefully engineered for easy installation, the HJL-57 requires no soldering, drilling or gluing. Simply plug it in and drop it right on the original CoCo mounting posts. Kit includes a new bezel for a totally finished conversion.

**Compare Warranties.**

The HJL-57 is built so well, it carries a full, one-year warranty. And, it is sold with an exclusive 15-day money-back guarantee.

**Compare Value.**

You know that a bargain is a bargain only so long as it lasts. If you shop carefully, we think you will agree...The HJL-57 is the last keyboard your CoCo will ever need. And that's **real** value.

**Order Today.**

Only $79.95, the HJL-57 is available for immediate shipment for either the original Color Computer (sold prior to October, 1982) or the F-version and TDP-100 (introduced in October, 1982), and the new 64K CoCo. **Now also available for CoCo 2.**

**Order by Phone Anytime**

**716-235-8358**

**24 hours, 7 days a week**

---

**Ordering Information:** Specify model (Original, F-version, or CoCo 2). Payment by C.O.D., check, MasterCard or Visa. Credit card customers include complete card number and expiration date. Add $2.00 for shipping ($3.50 for Canada). New York state residents add 7% sales tax.

**Dealer Inquiries Invited. For dealer information in Eastern U.S. and Canada, call collect: 617-586-7614, Advanced Computer Services (distributor), 74 Plain Street, Brockton, MA 02401.**

440

HJL
PRODUCTS INC.
955 Buffalo Road • P.O. Box 24954
Rochester, New York 14624

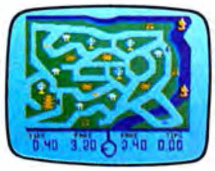
From Sesame Street to Outer Space…

# Radio Shack Has
# and Entertainment

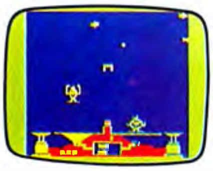
The CTW Software Group, a division of Children's Television Workshop, brings you ten game-style educational programs. Each one encourages children to experiment, explore and solve problems while having fun.

**For TRS-80® Color Computers with Extended BASIC** 19$^{95}$ Each

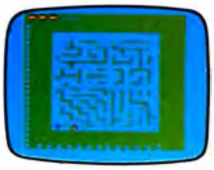
**Taxi.***** Kids earn fares and tips as they drive through six cities from New York to Shanghai. A Cooperative Strategy Game for ages 7 and up. #26-2509.



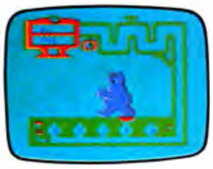
**Peanut Butter Panic.***** The sky's the limit as players cooperate to catch stars, make sandwiches, and win. A Cooperative Strategy Game for ages 7 and up. #26-2523.



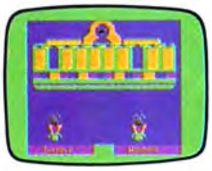
**Star Trap.***** Players must race through a maze to trap a slippery star before time runs out! A Cooperative Strategy Game for ages 7 and up. #26-2510.



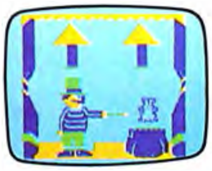
**Cookie Monster's Letter Crunch.™***** It's Cookie Time! Help Cookie Monster match words and letters to bake and eat cookies! A Basic Skills Game for ages 3-6. #26-2526.



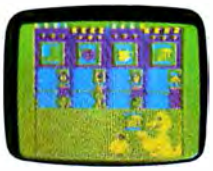
**Grover's Number Rover.™**** Grover's rover is ready to blast off! Hop aboard and help him play with Twiddlebugs and numbers! A Basic Skills Game for ages 3-6. #26-2522.



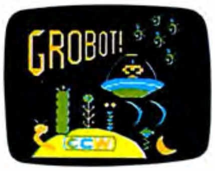
**Ernie's Magic Shapes.™**** Ernie wears the top hat, but you're the magician. Help Ernie match shapes and colors in six different ways. A Basic Skills Game for ages 3-6. #26-2524.



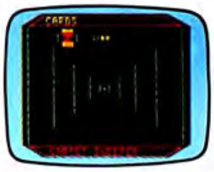
**Big Bird's Special Delivery.™**** Help Big Bird deliver the mail! Match the pictures and bring each package to the right store. A Basic Skills Game for ages 3-6. #26-2525.



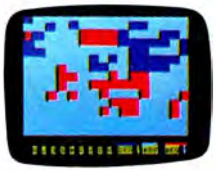
**Grobot.***** How well will your astro-garden grow? Plant, protect and harvest—it's up to you and Grobot. A Creative Exploration Game for ages 10 and up. #26-2527.



**Time Bound.***** Race through time and learn about history, in hot pursuit of your hapless assistant, Anacron. Creative Exploration Game for ages 10 and up. #26-2528.



**Flip Side.***** Stake your claim, surround the squares, and watch the screen flip colors! Planning is the key. A Creative Exploration Game for ages 10 and up. #26-2529.



*Joysticks required. **Cassette recorder required.
***Joysticks and cassette recorder required.

# the Educational Software You Want.

Why feed quarters into video game machines when you can bring arcade-style thrills into your own living room with Radio Shack's exciting Color Computer games. They can provide hours of fun for the whole family.

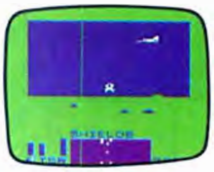
**Low As $19^{95}$**

**Gomoku and Renju.** The classic oriental game of strategy! Block your opponent while attempting to place five of your own men in a row Hours of fun. #26-3069. **$19.95**

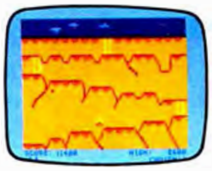
**Slay the Nerius.*** Defend your submarines against deadly starfish and the ancient seaworm—the fearsome Nerius, a creepy nemesis from the Deep. #26-3086. **$24.95**

**Double Back.*** As you "double back" to catch your own tail, try to encircle the "safe" screen objects to gain points in this tricky game. Challenges mount as you play. #26-3091. **$19.95**

**Star Blaze.*** Protect the Milky Way! Radar shows menacing vessels nearby. Seek, destroy and check radar again. Red alert! There's no let up in the excitement. #26-3094. **$19.95**



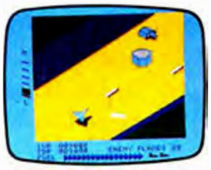
**Canyon Climber.*** An action game with a difference. As a cliff hanger, you're challenged by one test after another—kicking goats, zinging arrows and falling objects! #26-3089. **$34.95**



**Dungeons of Daggorath.*** You're pitted against a succession of awesome beasts. Each victory brings you closer to your ultimate opponent—the evil wizard! #26-3093. **$29.95**

**Baseball.** Nine innings of fun! You're in full control of this realistic simulation of America's Number One sport, both behind the plate and on the field. #26-3095. **$24.95**

**ZAXXON.***** The official home version of the great arcade favorite by Sega! Match wits with the deadly ZAXXON Robot! Challenges escalate as you progress. 32K required. #26-3062. **$34.95**



*Available at over 1100*
*Radio Shack Computer Centers and at*
*participating Radio Shack stores and dealers*

**Radio Shack®**
**COMPUTER CENTERS**
A DIVISION OF TANDY CORPORATION

**NEW 1984 TRS-80 CATALOG RSC-11.**
**Send me a free copy today.**

Mail To: Radio Shack
Dept. 84-A-925
300 One Tandy Center
Fort Worth, Texas 76102

NAME ____________________
ADDRESS ____________________
CITY ____________ STATE ____ ZIP ______
TELEPHONE ____________________

Prices apply at participating Radio Shack stores and dealers. Muppet characters are trademarks of Muppets, Inc. All rights reserved. ZAXXON is a registered trademark of Sega licensed to Datasoft, Inc.

*Continued from p. 8*

model you have. Or load a program such as VIP Writer or Telewriter-64 and see your buffer capacity.

*Neil Edward Parks*
*Beachwood, OH*

## MC-10 Real-World Interfacing

As an outgrowth of my electronics hobby, I bought an MC-10 because it's cheap enough to take apart and tinker with. Now I'd like to find ways to interface my machine with the real world. So far, I haven't had much luck, and I'd appreciate any information anyone out there can give.

*Vincent Messino*
*20 Giannone Road*
*Wayne, NJ 07470*

## On Overlays

I'd like to let software and hardware manufacturers in on a particular consumer need. I've given my CoCo a full-stroke keyboard, and use the machine for both hobby and serious applications. Some of the more serious programs I have come with keyboard overlays, but these helpful features no longer fit over my upgrade, nor do they work on the newer, white CoCos.

Granted, it's not a big deal, but a new method for labeling keys would be handy, and it would also be a selling point that could make one product a little more attractive than another.

*Joey Chevere*
*Waukegan, IL*

## Table Of Machine-Language Contents

After I got a good monitor program, I went back through my old *HOT CoCos* looking for machine-language programs that I couldn't type in before. It would have been a big help if the Table of Contents somehow indicated those programs that are in machine language.

*Andrew Athan*
*Pelham Manor, NY*

*We'll include this information when we compile our cumulative index.—eds.*

# On-Line

*Do you operate a BBS? Connect with readers through a letter to Feedback.*

## Color-80 of Syracuse

The Color-80 of Syracuse is a new, 24-hour CoCo BBS. We feature uploading, downloading, news, sports, merchandise, email, and more. We welcome all types of computers.

*Kris Olmstead, Sysop*
*Syracuse, NY*
*315-487-0503 (BBS)*

## POKE 'Pinion

After finding two references to the high-speed POKE 65495,0 in the February *HOT CoCo*, I thought I should write and explain a problem I've had with it.

If I type in a listing, add the POKE, run the program, and CSAVE it, I'll get an I/O error when I try to CLOAD it. The problem seems to come from running the program with the POKE in before you save it.

To avoid this problem—and losing your program—first type the listing as is, then check it and run it. When you're satisfied that all is as it should be, add the POKE to the listing and CSAVE.

*Wayne McArthur*
*Saskatoon, Saskatchewan*

## One Year, Two CoCos And My First *HOT CoCo*

After a year and two CoCos, my excitement over these terrific machines continues to grow. Friends with IBM PCs are amazed that the CoCo has such versatility—for 1/10th the price.

Mr. Elliot's letter in the March issue ("Better Resolution," *HOT CoCo*, p. 13) was a good one. How about some information on interfacing the CoCo (with hardware, if necessary) to RGB or Composite monitors? I've often wondered about 80 columns myself. (I know, buy an IV. . . .)

The article on "CoCo World Control" (*HOT CoCo*, March 1984, p. 72) was great. I'll be very interested in fol-

IT'S SIMPLE. . .CALL AND SAVE MONEY!

Since 1978 **1-800-841-0860**

GA. & INFO
912-377-7120

DIRECT MARKETING
COMPUTERS AND
EQUIPMENT
TO SAVE YOU MONEY!

FREE UPON REQUEST
•DISCOUNT PRICE LIST AND INFORMATION KIT
•COPY OF MFR'S WARRANTY
PRICES AND PRODUCTS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

AMDEK • COMREX • EPSON • C.ITOH
FRANKLIN • OKIDATA • COLUMBIA
$CALL

BOTEK $59
SERIAL TO PARALLEL
INTERFACE & CABLE

TRS-80
Color 2 FROM
Color Computer. . $CALL
Color Disc. . . . . . . $CALL
DMP 120 Printer. . $CALL

PRINTERS
FROM
Epson . . . . . . . . . . . $CALL
SCM TP-II. . . . . . . . $CALL
Gemini 10X. . . . . . $CALL

Man's Best Friend
MicroManagement Systems, Inc.
2803 Thomasville Road East
Cairo, Georgia 31728
TELEMARKET DEPT. #37
✓96

# Telewriter-64™
## the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
- **Easy hyphenation**
- **Drives any printer**
- **Embedded format and control codes**
- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

### THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
> — Color Computer News, Jan. 1982

### TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

### 64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

### 64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

### RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

### FEATURES & SPECIFICATIONS:

**Printing and formatting:** Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

**File and I/O Features:** ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

**Editing features:** Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
> — The RAINBOW, Jan. 1982

### PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs $49.95 on cassette, $59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

To order, send check or money order to:

**Cognitec**
**704 N. Nob St.**
**Del Mar, CA 92014**

121

Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited.

(Add $2 for shipping. Californians add 6% state tax. Allow 2 weeks for personal checks. Send self-addressed stamped envelope for Telewriter reviews from CCN, RAINBOW, 80-Micro, 80-U.S. Telewriter owners: send SASE or call for information on upgrading to Telewriter-64. Telewriter-compatible spelling checker (Spell 'n Fix) and Smart Terminal program (Colorcom/E) also available. Call or write for more information.)

Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is a trademark of Tandy Corp; MX-80 is a trademark of Epson America, Inc.

low-up applications. But it will take me awhile to build and debug the hardware, so there's no rush.

This is my first issue—does the excitement show?

*Michael B. Gallagher*
*Mercer Island, WA*

*We've published two articles, "Monochrome-Monitor Driver (*HOT CoCo, *July 1983, p. 36) and "Color-Monitor Driver (*HOT CoCo, *August 1983, p. 98), both by Marty Goodman, that tell how to interface black-and-white and composite monitors, respectively.—eds.*

## All the Way With 64K

I'm writing in praise of Richard Esposito's article, "64K Modification" (*HOT CoCo*, July 1983, p. 44). I bought a commercial 64K-upgrade kit only to find that it wouldn't work. Then I tried Mr. Esposito's method, and my 64K machine was up and running in about 30 minutes.

This was the first time I opened my CoCo—I'm definitely *not* an electrician. Any novice who wants to upgrade his system would do well to read the article.

*Gary N. McCarty*
*Hiawatha, KS*

## MC-10 Hex Dump

Thanks so much for John Cullings' MC-10 review (*HOT CoCo*, September 1983, p. 66). It contains a wealth of information and was invaluable in helping me write a teletype printer program for my machine.

The Australian PAL version has six more ICs, but looks and behaves the same. In most cases, a colon (:) replaces the ELSE command.

The modified monitor program is excellent, and you can make it even simpler by changing line 845 to the following:

```
845 IF C$ = "E" THEN CLS : END
```

The following changes will modify the same program to let you dump hex, the address, extra space, and 16 characters per line to a line printer:

```
0 REM MODS TO MIMO
122 FOR X = 1TO8
126 PA$ = PA$ + HB$ + " ":DA = DA + 1:
NEXT
341 LPRINTBA$" "FI$" "SE$
845 IF C$ = "E" THEN CLS : END
4340   00 00 00 00 00 00 43 59 00 00 83 20 4D
4F 44 53
```

*Frank Rees*
*Victoria, Australia*

## Basic Beat Factorials

I enjoyed Lesson 9 of James Wood's The Basic Beat (*HOT CoCo*, February 1984, p. 22), but I didn't see a routine to calculate factorials. To do so (i.e., 5! = 5*4*3*2*1), use the following simple routine:

```
5 ?"ENTER NUMBER";: INPUT N
10 X = 0: B = 1
15 A = (N - (X + 1))
20 B = B*A: X = X + 1
25 IF A <> 1 THEN 15
30 ?N;"! = ";N*B
```

You can also use this routine with the formula C = N!/(R!*(N − R)!) to calculate combinations. For example, how many five-card hands can you deal from a 52-card deck? This formula yields 52!/5!*47!, or 2,598,960 combinations of five-card hands.

*Wayne Putnam*
*Keene, NH*

## Gosh!

Whew! "Go" (*HOT CoCo*, February 1984, p. 92) is one tough game, but I really enjoy it. Peter Holden deserves credit for his creation. Now I have the March issue, and I'm looking forward to all the articles.

Gosh! When you said you would double the usefulness of my CoCo, you weren't kidding.

*David Duncan*
*Longmeadow, MA*

## Gemini-10X Info?

*HOT CoCo* is one of the primary reasons I like my CoCo so much. I also have a Commodore 64 and would like to find a magazine as good as yours for it.

I use a Gemini-10X printer with my CoCo and would like to find screen-print and other programs to work with it. I'd appreciate any help any of your readers can give me. I'd also like to swap information about either of my systems.

*John Jenkins*
*RD 2, Box 331*
*Colliers, WV 26035*

*Have you seen a copy of* RUN—*Wayne Green's new magazine for the Commodore 64 and VIC-20?—eds.*

## "Circuit Drawer" To Disk

In lines 1590 and 1600 of Mark Wilson's "Circuit Drawer" (*HOT CoCo*, February 1984, p. 58), change the T to T1 to let you save the program to disk.

*John J. Hydro*
*Easton, PA*

## Computer Ed For the Economically Disadvantaged

San Pablo Institute, a nonprofit public charity, is forming a computer education program for young people who would otherwise be unable to afford computers and instruction. The program offers free instruction and an opportunity to meet and share ideas with other young people interested in computers.

The San Pablo Computer Club is seeking donations of computers, peripherals, and software for hands-on learning and experimentation. All donations are tax-deductible, and we pay the shipping.

Get a tax break, plus the satisfaction of knowing that the computer you cut your teeth on is bringing the same experience to a kid who otherwise wouldn't have had the chance.

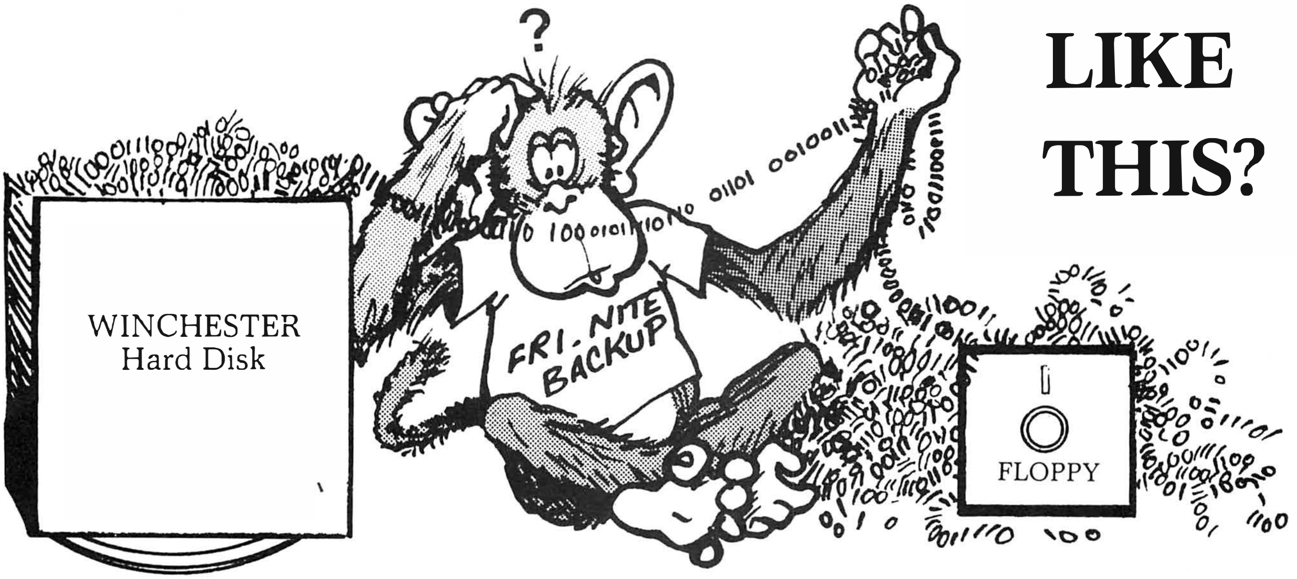
*San Pablo Institute*
*234 Mullen St.*
*San Francisco, CA 94110*

*Send your letters to Feedback,* HOT CoCo, *80 Pine St., Peterborough, NH 03458.*

# OS-9* DISK BACKUP

Does backing-up your hard disk make you feel

LIKE THIS?



For answers to this and other problems, call

## The OS9* Solution Team

(215) 337-3138

JBM'S MIDWARE

For more information or to place an order, contact:
Dept. HC 9
The JBM Group, Inc.
Continental Business Center
Front & Ford Streets
Bridgeport, PA USA 19405
TEL: 215-337-3138
TWX: 510-660-3999

the JBM group

VISA/MASTERCHARGE accepted. PA res. add 6% sales tax.
US orders, add $5.00 postage and handling.

* OS9 is a registered trademark of Microware Corp.

✓190

MAGIGRAPH

# NEW GOOD STUFF FOR EVERY COLOR COMPUTER

Turn your Color Computer into a graphic design center with the ease of a keystroke! **MagiGraph** makes it simple to create highly detailed figures up to and including an entire high-resolution screen. Designed for those with some experience in Basic and Assembly Language programming, **MagiGraph** includes lots of special features:

- **A full set of logical and pixel manipulation functions** simplifies the development of complex figures.
- **An editor** lets you zoom in and work on every detail of your design. Toggle between the "macro" and "micro" screens for perspective on your creations.
- **Nine animation buffers** allow you to preview each sequence to ensure continuity and smooth flow.
- **Versatile I/O routines** store a graphic screen on cassette or floppy disk; recall it later for use by another program or revise it with **MagiGraph**.

If you're looking for the finest graphic development utility available for your Color Computer, THIS IS IT. Maximize your machine's potential, while you push your imagination to the limit — with **MagiGraph**!

By Kevin Dooley. Cassette **$34.95** (16K required); Disk **$39.95** (32K Extended Color BASIC required); Amdisk cartridge **$44.95**.

## CSPOOL
## Color Computer Print Spooler

Stop Waiting Around for the Printer! **CSPOOL** allows you to use your printer and computer concurrently, takes only 26 bytes of Color Basic's memory, and gives you 32K of print buffer. It's like having two computers in one! By intercepting characters sent to the printer and storing them in the upper 32K of RAM, **CSPOOL** allows you to run other programs while your printer is doing its job. **CSPOOL** is FREE with the purchase of a 64K RAM UPGRADE KIT from The Micro Works, or it may be purchased separately on cassette or diskette for **$19.95**. Requires 64K; not for FLEX or OS9.

**64K MEMORY UPGRADE KIT**: For Rev. levels E, ET, NC, TDP-100s, and Color Computer II. Eight prime 64K RAM chips, instructions, and CSPOOL: **$64.95**.

---

## SYSTEMS SOFTWARE

**MACRO-80C: DISK-BASED EDITOR, ASSEMBLER AND MONITOR**—With all the features the serious programmer wants, this package includes a powerful 2-pass macro assembler with conditional assembly, local labels, include files and cross referenced symbol tables. MACRO-80C supports the complete Motorola 6809 instruction set in standard source format. Incorporating all the features of our Rompack-based assembler (SDS-80C), MACRO-80C contains many more useful instructions and pseudo-ops which aid the programmer and add power and flexibility. The screen-oriented editor is designed for efficient and easy editing of assembly language programs. MACRO-80C allows global changes and moving/copying blocks of text. You can edit lines of assembly source which exceed 32 characters. DCBUG is a machine language monitor which allows examining and altering of memory, setting break points, etc.

Editor, assembler and monitor—along with sample programs—come on one Radio Shack compatible disk. Extensive documentation included. By Andy Phelps. **$99.95**

**SDS-80C: SOFTWARE DEVELOPMENT SYSTEM**—Our famous editor, assembler and monitor in Rompack. Like MACRO-80C, it allows the user to write, assemble and debug assembly language programs with no reloading, object patching or other hassles. Supports full 6809 instruction set. Complete manual included. **$89.95**

**MICROTEXT: COMMUNICATIONS VIA YOUR MODEM!** Now you **can** use your printer with your modem! Your computer can be an intelligent printing terminal. Talk to timeshare services or to other personal computers; print simultaneously through a second printer port; and re-display text stored in memory. Download text to Basic programs; dump to a cassette tape, or printer, or both. Microtext can be used with any printer or no printer at all. It features user-configurable duplex/parity for special applications, and can send any ASCII character. You'll find many uses for this general purpose module! ROMPACK includes additional serial port for printer. **$59.95**

### MICRO WORKS COLOR FORTH

- Faster to program in than Basic
- Easier to learn than Assembly Language
- Executes in less time than Basic

The MICRO WORKS COLOR FORTH is a Rompack containing everything you need to run Forth on your Color Computer. COLOR FORTH consists of the standard Forth Interest Group (FIG) implementation of the language plus most of FORTH-79. It has a super screen editor with split screen display. Mass storage is on cassette. COLOR FORTH also contains a decompiler and other aids for learning the inner workings of this fascinating language. It will run on 4K, 16K, and 32K computers. And COLOR FORTH contains 10K of ROM, leaving **your** RAM for **your** programs! There are simple words to effectively use the Hi-Res Color Computer graphics, joysticks, and sound.

Includes a 112-page manual with a glossary of the system-specific words, a full standard FIG glossary and complete source listing.

MICRO WORKS COLOR FORTH . . . THE BEST! From the leader in FORTH, Talbot Microsystems. **$109.95**

### MACHINE LANGUAGE

**MONITOR TAPE:** A cassette tape which allows you to directly access memory, I/O and registers with a formatted hex display. Great for machine language programming, debugging and learning. It can also send/receive RS232 at up to 9600 baud, including host system download/upload. 19 commands in all. Relocatable and reentrant. **CBUG TAPE: $29.95**

**MONITOR ROM:** The same program as above, supplied in 2716 EPROM. This allows you to use the entire RAM space. And you don't need to reload the monitor each time you use it. The EPROM plugs into the Extended Basic ROM Socket or the Romless Pack I. **CBUG ROM: $39.95**

**SOURCE GENERATOR:** This package is a disassembler which runs on the Color Computer and generates your own source listing of the BASIC interpreter ROM. Also included is a documentation package which gives useful ROM entry points, complete memory map, I/O hardware details and more. A 16K system is required for the use of this cassette. **80C Disassembler: $49.95**

## HARDWARE

**PARALLEL PRINTER INTERFACE**—Serial to parallel converter allows use of all standard parallel printers. PI80C plugs into the serial output port, leaving your Rompack slot free. You supply the printer cable. **PI80C: $59.95**

**SUPER-PRO KEYBOARD—$69.95** (For computers manufactured after Oct. 1982, add $4.95)

**ROMLESS PACKS** for your custom EPROMS — call or write for information.

## BOOKS

**6809 ASSEMBLY LANGUAGE PROGRAMMING**, by Lance Leventhal, $18.95

**TRS-80 COLOR COMPUTER GRAPHICS**, by Don Inman, **$14.95**

**ASSEMBLY LANGUAGE GRAPHICS FOR THE TRS-80 COLOR COMPUTER**, by Don Inman, **$14.95**

**STARTING FORTH**, by L. Brodie, **$17.95**

## GAMES

**ZAXXON**—The real thing. Excellent. What more can we say? Cassette requires 32K. **$39.95**

**STAR BLASTER**—Blast your way through an asteroid field in this action-packed Hi-Res graphics game. Available in ROMPACK; requires 16K. **$39.95**

**PAC ATTACK**—Try your hand at this challenging game by Computerware, with fantastic graphics, sound and action! Cassette requires 16K. **$24.95**

**HAYWIRE**—Have fun zapping robots with this Hi-Res game by Mark Data Products. Cassette requires 16K. **$24.95**

**ADVENTURE**—*Black Sanctum* and *Calixto Island* by Mark Data Products. Each cassette requires 16K. **$19.95** each.

**CAVE HUNTER**—Experience vivid colors, bizarre sounds and eerie creatures as you wind your way through a cave maze in search of gold treasures. This exciting Hi-Res game by Mark Data Products requires 16K for cassette version. **$24.95**

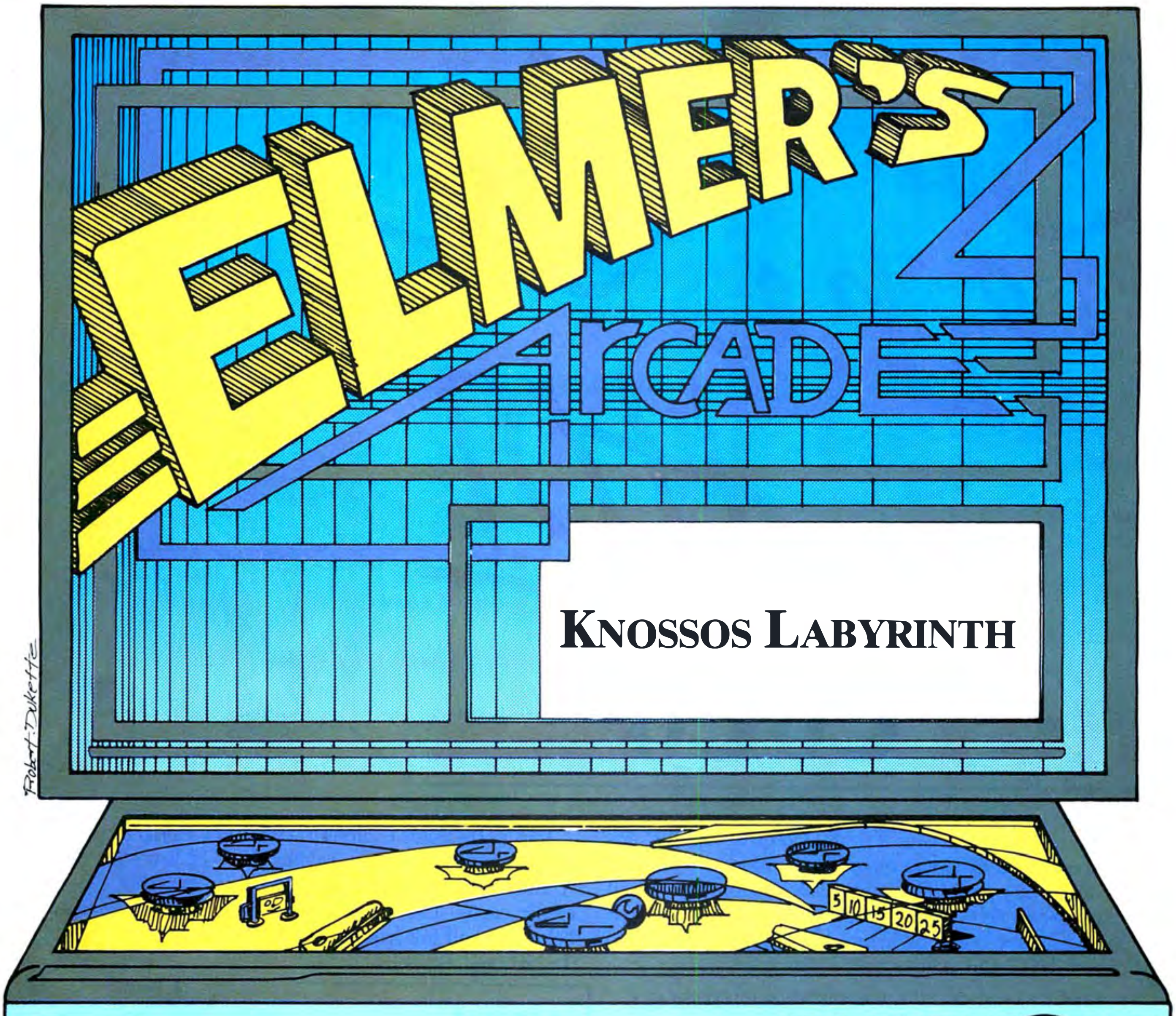
THE MICRO WORKS

P.O. Box 1110-D
Del Mar, CA 92014
(619) 942-2400

California Residents add 6% Tax

Master Charge/Visa and COD Accepted

196



# KNOSSOS LABYRINTH

instant CoCo

*by Richard Ramella*

Elmer went to Greece on vacation and guess who got stuck running the arcade? I'm always "Guess Who" in such situations.

It drove me nuts—that cacophony of jangling coins, bells, whistles, and yelps. The breaking point came on the 13th day, when a kid about 7 years old swaggered up to the counter and said, "Hey, mister, these slugs don't work in the Felix-the-Cat-movie machine."

"You're supposed to use pennies, not slugs! Get out of here, you diminutive creep!"

With a guarded smirk, the kid backed toward the door. A large form appeared behind him. The boy screamed as he was scooped ceilingward.

I ran from behind the counter to stop the mayhem. Then I stopped myself.

The little kid was laughing because the bearlike figure was tickling him. "Stop it, Uncle Elmer!" yelled the kid in delight.

I looked closely. Behind the tan visage and under the travel-rumpled white-linen suit, was Elmer. Elmer was back! I could leave now. "It was horrible, and good-bye," I said, throwing the change apron at him.

"What's the problem?" he asked.

"I need a rest, Elmer."

Elmer put his bags behind the counter, lit a cigar stub and tied the change apron around his ample middle. "Don't you even want to see what I brought you from Greece?"

"Well, of course, Elmer. I've been sitting here for 30 days thinking of nothing else! I haven't even eaten for pondering what marvelous trinket will soon be mine!"

"Shell shock," he muttered. He paused to pass out some change to waiting customers, then dug into his luggage.

*System Requirements*

**16K RAM**
**Extended Color Basic**
**Joysticks (optional)**

Some Like It HOT
HOT CoCo®

Guaranteed to make your TRS-80 Color Computer* sizzle with color, **HOT CoCo** magazine is informative, interesting, and *best of all* just for the Color Computer. You'll look forward to **HOT CoCo** month after month because it has something for everyone, from the novice right on up to the expert. **HOT CoCo** gives you:

- •PROGRAMMING TECHNIQUES & TUTORIALS—that promise to make you a superior programmer.
- •UTILITIES—to save you time and effort on all your routine tasks.
- •EXPERTLY WRITTEN COLUMNS—including *BASIC, GRAPHICS, FLEX and GAMES.*
- •HARDWARE & CONSTRUCTION—ideas on interfacing and enhancing to make building projects a breeze.
- •EDUCATIONAL APPLICATIONS—will stimulate and encourage imaginative thinking in your child.

*PLUS*

- •BUSINESS PROGRAMS—sure to make you a star at the office.
- •FEATURES ON COLOR APPLICATIONS—make your computer reach its full potential and get your money's worth from your machine.
- •BUYER'S GUIDES & PRODUCT REVIEWS—now you can stop running around comparing prices and products and start running your computer.
- •HOME & HOBBY APPLICATIONS—exciting ways to help your computer add enjoyment to your leisure time.
- •ANSWERS TO SPECIFIC QUESTIONS—it's like having your own private consultant—free!

Join in the color explosion with **HOT CoCo** today! Take advantage of our money saving offer, 12 issues for $24.97. A 13th issue is yours FREE with pre-payment (check or credit card). Use the attached order form, the coupon below, or call toll free 1-800-258-5473.
(In NH. call 1-924-9471)

*YES!* I want my Color Computer to sizzle with color. I understand that with payment enclosed or credit card order I will receive a free issue making a total of 13 issues for $24.97.

HOT CoCo
Build a Voice Box
Graphics! Create a Masterpiece

☐ CHECK/MO ☐ MC ☐ VISA ☐ AE ☐ BILL ME

card #____________________ exp. date______
signature____________________________
name________________________________
address______________________________
city______________ state________ zip__________

*Canada & Mexico $27.97/1 yr. only, U.S. funds drawn on U.S. bank.*
*Foreign Surface $44.97/1 yr. only, U.S. funds drawn on U.S. bank.*
*Please allow 6-8 weeks for delivery.*

**HOT CoCo • PO Box 975 • Farmingdale NY 11737**

* TRS-80 Color Computer is a trademark of Radio Shack, a division of Tandy Corp. **346F4**

Out came a small box. I fumbled it open. Inside was a red wooden container with a clear plastic cover. Beneath the cover was a beautiful circular maze formed of round wooden walls. The object was to take several ball bearings to the center, the heart of the maze.

"Very nice, Elmer. Thank you very much."

"It's a small labyrinth," he said. "Labyrinth is from the Greek word labyrinthos. I was just in Greece, you know." When I nodded, he went on. "According to Greek legend, Daedelus built a labyrinth for the Cretan King Minos, who needed it to imprison the Minotaur, a monster. Later, Theseus, who was the son of a Greek king, found his way into and out of the labyrinth with the help of a ball of yarn given him by Ariadne, Minos' daughter. Theseus slew the Minotaur."

"I'm interested, Elmer, but the stage is getting crowded."

"Look up the cast at the library," he said. "Anyway, many years later, archaeologists found a palace that's thought to be the Cretan labyrinth. It's located near Knossos."

"Wow!" I said, falling back into Civil War slang. "And you went there and saw it?"

"I didn't say that. Truth is, I made some friends in Piraeus. We sat on a verandah and had refreshments and talked."

"For a month?"

"Have I been gone that long? Yeah, I suppose so."

"So you didn't see the labyrinth."

"The story was told to me by a reliable source. And I did pick up this maze in one of the best souvenir shops in the town."

"I am, as usual, touched by your thoughtfulness, Elmer."

He eyed me carefully, ready to pounce if he saw a scintilla of sarcasm. But I *was* touched.

"It's not just a toy," he said. "It's myth, adventure, a glimpse of the misty past."

"Yeah," I agreed, "and it's a new computer game for certain."

"Oh no!" Elmer smote his brow.

I barely took notice. "I haven't fooled with round shapes too much, but the CoCo does have the CIRCLE command..." I wandered away, the title "Knossos Labyrinth" already cemented in my mind.

> *" 'It's not just a toy,' he said. 'It's myth, adventure, a glimpse of the misty past.' "*

### The Game

I'm pleased to report Elmer has again provided a wonderful inspiration. Here's how to play Knossos Labyrinth, which requires 16K Extended Color Basic. Type RUN and tap enter. KNOSSOS, the name of the game, appears on a green screen along with the following prompt: <J>OYSTICK OR <M>ANUAL?

The two legal answers to the prompt are J and M.

If you choose the joystick, plug a joystick into the right joystick port. Hold the controller in your hand so the red button is facing away from you.

If you choose manual, you will be pressing the four directional arrows to travel.

When you have made your choice, the program goes into the highest available resolution. At screen left, KNOSSOS is written vertically. A line is drawn down the screen at the right of this word. To the right of the line a bull's-eye design with 23 walls is drawn. Then a series of openings and new walls are drawn within it.

While the circle maze is being drawn, you will see a dot frozen in position to the right of the vertical line on a level with the bottom of the K in KNOSSOS. This dot is you. When the maze is complete, the dot begins to move. You can control the direction of travel by using the movement mode you've chosen—joystick or manual.

The object is to travel to the exact center of the maze. When you strike the center, the display freezes and a series of beeps sound. You have won. Tap the break key to start another

```
100 REM * KNOSSOS LABYRINTH * TR
S-80 EXTENDED COLOR BASIC *
110 REM * ELMER'S ARCADE * JUNE
'84 * RICHARD RAMELLA *
120 DATA 15,4,10,27,13,17,30,4,2
1,13,26,27,15,29,10,52
130 DATA 15,29,18,52,18,52,23,30
,15,54,8,62,8,62,15,79
140 DATA 15,79,22,63,22,63,15,54
,22,79,8,89,8,89,20,94
150 DATA 20,94,8,104,22,104,8,11
4,8,114,20,119,20,119,8,129
160 DATA 15,129,8,137,8,137,15,1
54,15,154,22,138
170 DATA 22,138,15,129,22,154,8,
164,8,164,20,170,20,170,6,179
180 U$=CHR$(94)
190 D$=CHR$(10)
200 L$=CHR$(8)
210 R$=CHR$(9)
220 DIM S(92)
230 CLS
240 PRINT @ 236,"KNOSSOS";
250 PRINT @ 290,"";
260 INPUT "<J>OYSTICK OR <M>ANUA
L";A$
270 IF A$<>"J" AND A$<>"M" THEN
230
280 FOR A=1 TO 92
290 READ S(A)
300 NEXT
310 PMODE 4,1
320 PCLS
330 SCREEN 1,0
340 PSET(70,25,3)
350 LINE(50,0)-(256,192),PSET,B
360 FOR A=1 TO 89 STEP 4
370 LINE(S(A),S(A+1))-(S(A+2),S(
A+3)),PSET
380 NEXT A
390 FOR X=4 TO 92 STEP 4
400 CIRCLE(160,96},X
410 NEXT
420 FOR X=4 TO 92 STEP 2
430 G=RND(0)
440 IF G<S-1 OR G>S+1 THEN 430
450 S=G
460 HJ=HJ+1
470 IF X>5 AND HJ/2=INT(HJ/2) TH
EN FOR E=X-1 TO X+1: CIRCLE(160,
96),E,1,1,G,G+.02: NEXT E ELSE C
IRCLE(160,96),X,0,1,G,G+.0199
480 NEXT X
490 A=70
500 B=25
510 PSET(A,B,3):IFA=160ANDB=96TH
EN650
520 IF A$="J" THEN 570
530 B$=INKEY$
540 IF LL<2 AND B$="P" THEN FOR
VV=1 TO 5: CIRCLE(A,B),VV,8: SOU
ND 100,1: NEXT VV: LL=LL+1
550 IF B$<>"" THEN GOSUB 670
560 GOTO 580
570 M=JOYSTK(0):N=JOYSTK(1)
580 P=A:Q=B
590 IFM<31.5ANDPPOINT(A-1,B)=0TH
ENA=A-1
600 IFM>31.5ANDPPOINT(A+1,B)=0TH
ENA=A+1
610 IFN>31.5ANDPPOINT(A,B+1)=0TH
ENB=B+1
620 IFN<31.5ANDPPOINT(A,B-1)=0TH
ENB=B-1
630 PRESET(P,Q)
640 GOTO 510
650 SOUND RND(8)*13,1
660 GOTO 650
670 IF B$=U$ THEN N=30 ELSE IF B
$=D$ THEN N=32 ELSE IF B$=L$ THE
N M=30 ELSE IF B$=R$ THEN M=32
680 RETURN
690 END
```

*Program Listing*

game. You haven't won until you hear the beeps.

In some games a sneaky thing occurs. You may find there is absolutely no way to enter the next inner cicle of the maze. For this reason, I'm going to equip you with two firecrackers. If you reach a wall that has no opening, tap P for pow, and a hole will be blown in the wall against which the player piece rests. Five beeps will sound. You can only do this twice a game.

That's all there is to it, except for the fact that maneuvering becomes tougher as you move toward the center of the maze. It is more difficult to win playing manually than with the joystick.

Some program notes are in order.

This program does a good job for all its brevity, and I must give most of the credit to the different ways the CIRCLE command can be used in Extended Color Basic.

First, the data in lines 120-170 are the coordinates for line commands that spell the word KNOSSOS on the graphics screen.

The circle maze's creation starts with the outward building of the bull's-eye display in the loop going from lines 390 to 410. The 23 walls go from diameters of 4 to 92 by increments of four.

> *"If you prefer fast arcade games, I invite you to rename this game Nebula of Doom..."*

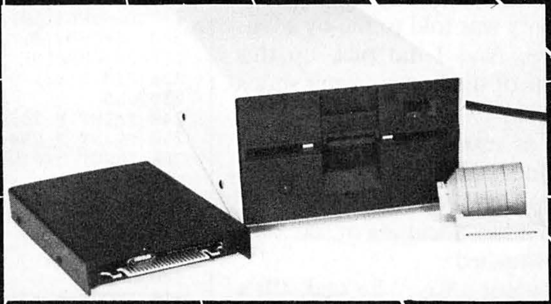
The openings and blocked passages are created in the loop in lines 420–480. Line 420 starts the program checking outward from the center of the circle at random points around the circumference. Because it increments by 2, it will in turn find a wall and open it, then a passageway, which it blocks. There is usually an open way to the center. If not, you have your two firecrackers.

If you prefer fast arcade games, I invite you to rename this game Nebula of Doom and regard the dot moving to the center as a spacecraft traveling at Warp-Woof speed. That should be fast enough for you.

The player piece is given impulse to move in only four directions: northeast, northwest, southeast, and southwest. It will not travel through walls, and there will be times when apparent wall openings prove to be open except for one small brick that denies entrance. But keep looking around. Remember, it wasn't easy for Theseus either. ■

---

*Address correspondence to Richard Ramella, 1493 Mt. View Ave., Chico, CA 95926.*



The Driving Force!

JFD - COCO DISC SYSTEM - $449

J & M Systems, Ltd. is a leader in the Model III marketplace with our JFD-III Disc Controller. With thousands in operation, we have set new standards in controller performance and reliability. We bring these same high standards to the COCO, resulting in the highest quality disc controller system on the market. Compare these functions before you buy:

- Price. $449 includes controller, first drive, disc basic in ROM, and manuals. Just plug it in.
- Never needs adjusting. Our exclusive Digital Phase Lock Loop Data Separator and Digital Precomp Circuit eliminates the 3 adjustments found on other controllers.
- High quality standard production disc drives. For improved service and reliability. Tandon & Teac drives provide twice the read sensitivity that the drives found in other disc systems do, and hold their alignment far longer.
- Gold-plated card edge connectors throughout.
- Software compatible with Radio Shack Disc Basic, Flex, and OS/9.

J & M Systems, Ltd., 137 Utah NE, Albuquerque, N.M. 87108
(505) 265-1501

J&M SYSTEMS, LTD.

101

# TEN MOST-ASKED QUESTIONS about DYNACALC™

## THE ELECTRONIC SPREAD-SHEET FOR 6809 COMPUTERS

---

**1. What is an electronic spread-sheet, anyway?**
Business people use spread-sheets to organize columns and rows of figures. DYNACALC simulates the operation of a spread-sheet without the mess of paper and pencil. Of course, corrections and changes are a snap. Changing any entered value causes the whole spread-sheet to be re-calculated based on the new constants. This means that you can play, 'what if?' to your heart's content.

**2. Is DYNACALC just for accountants, then?**
Not at all. DYNACALC can be used for just about any type of job. Not only numbers, but alphanumeric messages can be handled. Engineers and other technical users will love DYNACALC's sixteen-digit math and built-in scientific functions. You can build worksheets as large as 256 columns or 256 rows. There's even a built-in sort command, so you can use DYNACALC to manage small data bases — up to 256 records.

**3. What will DYNACALC do for ME?**
That's a good question. Basically the answer is that DYNACALC will let your computer do just about anything you can imagine. Ask your friends who have VisiCalc™, or a similar program, just how useful an electronic spread-sheet program can be for all types of household, business, engineering, and scientific applications. Typical uses include financial planning and budgeting, sales records, bills of material, depreciation schedules, student grade records, job costing, income tax preparation, checkbook balancing, parts inventories, and payroll. But there is no limit to what YOU can do with DYNACALC.

**4. Do I have to learn computer programming?**
NO! DYNACALC is designed to be used by non-programmers, but even a Ph.D. in Computer Science can understand it. Even experienced programmers can get jobs done many times faster with DYNACALC, compared to conventional programming. Built-in HELP messages are provided for quick reference to operating instructions.

**5. Do I have to modify my system to use DYNACALC?**
Nope. DYNACALC uses any standard 6809 configuration, so you don't have to spend money on another CPU board or waste time learning another operating system.

## Order your DYNACALC today!

---

**Foreign Dealers:**

Australia & Southeast Asia: Order from Paris Radio Electronics, 161 Bunnerong Road (PO Box 380) Kingsford, 2032 NSW Australia. Telephone: 02-344-9111.

United Kingdom: order from Compusense, Ltd., PO Box 169, London N13 4HT. Telephone: 01-882-0681.

Scandinavia: order from Swedish Electronics hk AB, Murargatan 23-25, Uppsala S-754 37 Sweden. Telephone: 18-25-30-00.

**6. Will DYNACALC read my existing data files?**
You bet! DYNACALC has a beautifully simple method of reading and writing data files, so you can communicate both ways with other programs on your system, such as the Text Editor, Text Processor, Sort/Merge, STYLOGRAPH™ word processor, RMS™ data base system, or other programs written in BASIC, C, PASCAL, FORTRAN, and so on.

**7. How fast is DYNACALC?**
Very. Except for a few seldom-used commands, DYNACALC is memory-resident, so there is little disk I/O to slow things down. The whole data array (worksheet) is in memory, so access to any point is instantaneous. DYNACALC is 100% 6809 machine code for blistering speed.

**8. Is there a version of DYNACALC for MY system?**
Probably. You need a 6809 computer (32k minimum) with FLEX™, UniFLEX™, or OS-9™ operating system. You also need a decent crt terminal, one with at least 80 characters per line, and direct cursor addressing. If your terminal isn't smart enough for DYNACALC, you probably need a new one anyway. The UniFLEX and OS-9 versions of DYNACALC allow you to mix different brands of terminal on the same system. There's also a special version of DYNACALC for Color Computers equipped with FLEX (Frank Hogg or Data-Comp versions).

**9. How much does DYNACALC cost?**
The FLEX versions are just $200 per copy; UniFLEX version $395; OS-9 version (works with LEVEL ONE or LEVEL TWO) $250. Orders outside North America add $7 per copy for postage. We encourage dealers to handle DYNACALC, since it's a product that sells instantly upon demonstration. Call or write on your company letterhead for more information.

**10. Where do I order DYNACALC?**
See your local DYNACALC dealer, or order directly from CSC at the address below. We accept telephone orders from 10 am to 6 pm, Monday through Friday. Call us at 314-576-5020. Your VISA or MasterCard is welcome. Please specify diskette size for FLEX or OS-9 versions. Software serial number is required for the UniFLEX version.

---

**Computer Systems Center**
13461 Olive Blvd.
Chesterfield, MO 63017
**(314) 576-5020**

CSC

506

---

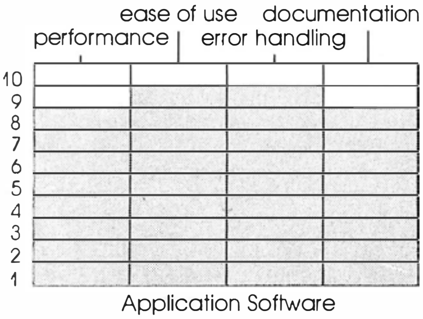
**UniFLEX software prices include maintenance for the first year.**

**DYNACALC is a trademark of Computer Systems Center**

VisiCalc is a trademark of VisiCorp.
STYLOGRAPH is a trademark of Great Plains Computer Co.
RMS is a trademark of Washington Computer Services.
FLEX and UniFLEX are trademarks of TSC.
OS-9 is a trademark of Microware and Motorola.

BY STUART HAWKINSON

# THE (WORD-PROCESSING) POWER ELITE



**Elite-Word**
**Elite Software**
**Box 11224**
**Pittsburgh, PA 15238**
**32K, Extended Color Basic**
**$59.95 cassette or disk**

Elite-Word is a terrific word processor with an impressive list of features, yet it's easy to learn and use. It won't do everything that a professional office system can do, but it can handle most needs in the home and small business environment.

Gone are the multiple menus that read like an adventure game. Gone, too, are the problems of formatting text and wondering what the printed page will look like. Elite-Word shows you the final version right on the screen, and that feature alone is worth the price. You also get super keyboard response and the ability to merge text files.

Elite-Word is a full-screen text editor that provides complete control of cursor movement throughout the text. Not only can you move the cursor with the arrow keys, but you can jump forward or backward one page, or to the beginning or end of the file, with simple one- or two-key commands.

> Elite-Word features an impressive list of options for a text editor suited to home and small business uses.

Elite-Word is packed with many well-designed, smoothly operating features. The program is all machine language and integrated with Extended Color Basic (or Disk Basic in the disk version). It's small enough to be in memory at all times, so you don't need to load overlays to the program when new functions are called for.

You load the program by running a simple Basic driver that sets Elite-Word to your printer specifications. The manual clearly shows how to customize the program to use your particular printer codes for alternate fonts and special character sets. You can also imbed these codes in the file to change the font for any string of characters in the text. The driver program also sets the baud rate for your printer, if desired.

The Elite-Word manual serves as both an introduction to word processing and a reference guide to the program. It begins with a short tutorial, leading you through a quick session with a sample text file. After introducing you to most of the commands, the manual discusses those commands in reference-style format. Separate chapters cover screen editing, imbedded format controls, and variable text (loading from alternate disk files).

The manual also discusses printer codes, errors, and the driver program. A quick-reference section contains a summary of all the commands and control keys. Although there is no index, the extensive table of contents serves the same purpose. Elite-Word's display is a high-resolution, 32-character-per-line format. The font is a well-formed upper/lowercase set, with two-pixel descenders (very easy to read). You have the choice of a black-on-green or black-on-buff screen, and by adjusting the color and brightness controls of your TV or monitor, you can get a wide variety of comfortable displays.

Other options include word-wrap (on/off) and a special carriage return (CR) display (on/off). This latter option is especially important when formatting text. You need to place return characters exactly to control paragraphs and separate lines. It is sometimes difficult with other systems to tell where return characters are inserted in the text.

## The Commands

Elite-Word begins in the command mode, and hitting the enter key lets you scroll through the command prompts and serves as a simple help screen, making recalling commands a breeze.

The program offers several options to search for character strings. The find command locates any string of characters, which you can then edit, change, or delete. This useful command lets you globally replace text and makes word changes painless.

The editing modes are fast and efficient and display on the top line the number of characters left in memory and how many characters you are from the beginning of the file. You can manipulate your text with a versatility and simplicity that isn't always easy to find on the Color Computer, with its lack of a set of dedicated control keys.

A simple again command tells you where a string next occurs. However, when you use the change command, you will delete the chosen string everywhere it appears. It would be nice if you could choose which appearances of a certain string you wanted to delete.

But one of Elite-Word's most serious editing problems occurs with the find command. It appears to be one of software's most common ailments: off by one.

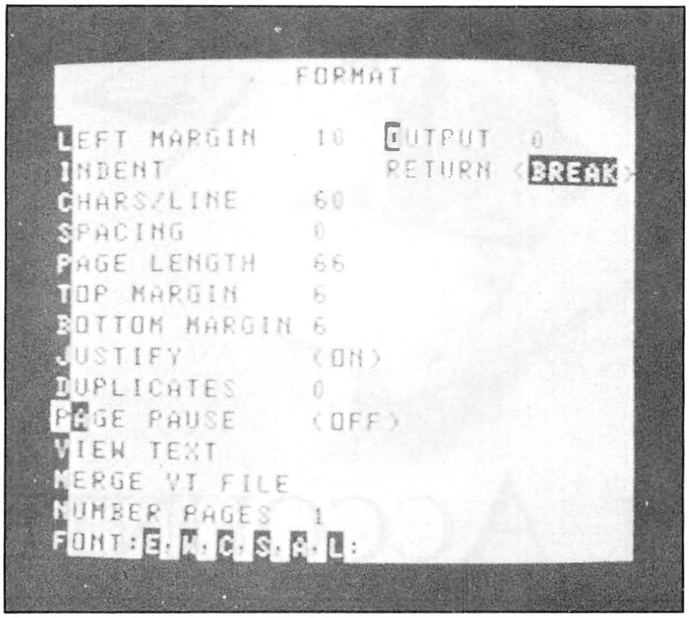
Sometimes when you try to find, change, or delete a string, you don't get what you expected. Say your search string is "low," and you have words like "lower" and "yellow" in your text. Most text editors will find all "low" combinations in the text, but Elite-Word fails to find the "low" in "yellow."

The problem is with the double l in "yellow." Apparently, Elite-Word doesn't reset a pointer correctly after it finds that the first l doesn't fit with the rest of the search string. As a result, the program skips over the next l and resumes the search at o. Therefore, it never finds the correct combination.

If you search for "low" in a text file that contains the string "lllow," the find command works properly, confirming the "off by one" error.

Elite-Word works well with any printer, and you can imbed special control codes in the text. Most formatting commands available to the printer formatting section are also available for immediate control anywhere in the text. You can insert commands to center text, change line or page formatting, or request special fonts, as well as send any sequence of special characters to the printer for control.

A special feature of Elite-Word allows for changes in letter size (double width) to correlate with line length. You don't have to explicitly change line lengths after imbedding control codes.



```
            FORMAT
LEFT MARGIN    10   OUTPUT  0
INDENT              RETURN <BREAK>
CHARS/LINE     60
SPACING        0
PAGE LENGTH    66
TOP MARGIN     6
BOTTOM MARGIN  6
JUSTIFY        <ON>
DUPLICATES     0
PAGE PAUSE     <OFF>
VIEW TEXT
MERGE VI FILE
NUMBER PAGES   1
FONT:E.W.C.S.A.L:
```

*Fig. 2. Text-Format Screen*

## Program Functions

The disk version of Elite-Word is enhanced by several commands. You can view the directory and free space on each drive, as well as set the default-drive number.

When saving text files, you can choose from compact binary or ASCII file storage. You can also save files in their printed format, although you can't reload this format without losing the format control codes. Specifying file types and extensions is not necessary, if you rely on the default values. You can't delete or rename files directly from Elite-Word. However, you can exit to Basic and perform these operations.

Flexible formatting is another of Elite-Word's strong points. When you are ready to print or view the formatted file, the program offers a full menu of formatting options. You can specify page length, line length, line spacing, default values for indentation and margins, page numbering, font selection, and justification.

Elite-Word will right-justify or center text, but will not print text flush-right (as, for example, in a letter heading). The printer format controls are saved with the text in the default mode. This makes it unnecessary to reenter the options each time you read a file.

Elite-Word lets you choose the pages you want to print. That, combined with a pause after each page, lets you print selected pages, so you save time and paper during the editing process.

The most impressive feature of Elite-Word is its ability to display your formatted text just as it will be printed. This view option displays the text in a special 64-character-per-line format. The small characters are difficult to read, but are clear enough to give you an idea of the final printed form.

You can scroll from beginning to end in this mode. However, you can't go backwards in the file. The view option also displays page breaks as dashed lines.

Elite-Word also provides an option to include other files in the printing routine. You can imbed names of files to be inserted into your text. This makes the inclusion of "boiler plate" text in reports a snap.

You can also read and insert individual lines of text from a designated variable-text file. Adding files in the edit mode is limited to appending files at the end of the current text. So, you can only insert new text in the print mode.

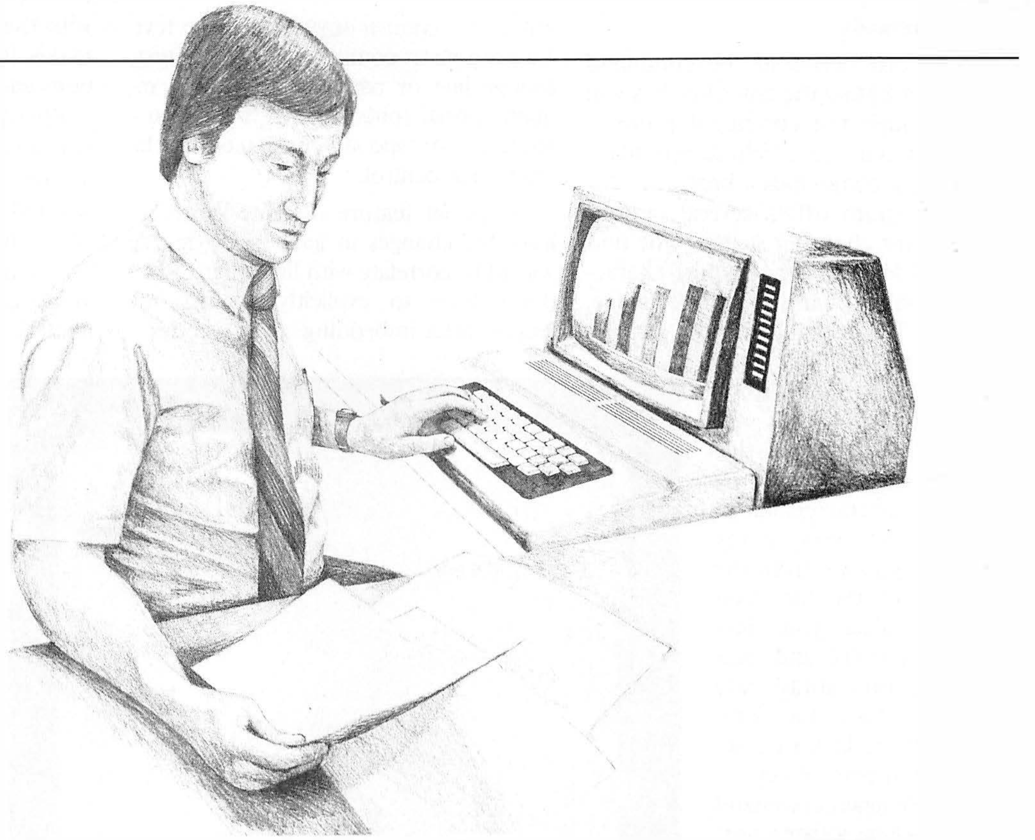
Some features are missing or are difficult to accomplish with Elite-Word. There is no provision to automatically print headers or footers in the document. The best you can manage is to carefully insert header (or footer) lines manually in the text. You can read them from a variable-text file, but you must imbed the commands at just the right spots, and you must do this tedious process exactly at page breaks to be effective.

Elite-Word also lacks the ability to automatically indent specified levels, as in an outline or technical presentation. You will have to manually insert the indentation in the text. It does not have two-column formatting, proportional spacing, or a spelling checker. But, those are the features of a much more expensive office-quality word-processing system.

Elite-Word is certainly an excellent word processor. I'll use it for all my future CoCo writing projects. It's simple to learn, easy to use, and well worth the investment. ■

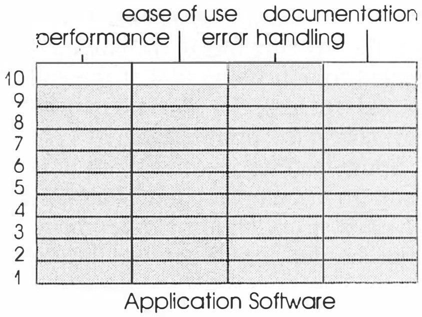
REVIEW

BY STEVE BROWN



# IT'S ALL ACCOUNTED FOR

The small-business man gets the most out of the CoCo with Mark Data's Business Accounting System.



Application Software

**Business Accounting System**
**Mark Data Products**
**24001 Alicia Parkway, No. 207**
**Mission Viejo, CA 92691**
**32K, 80-column printer**
**$99.95 disk**

Still think the Color Computer is only a game machine? Then you haven't seen some of the newer business and professional software for it, like Mark Data's Business Accounting System that offers the small-business man a powerful and economical way to produce reports and keep track of his business records.

This menu-driven accounting system consists of a family of programs that interact to manage everything from journal entries to balance-sheet preparation. You get programs to create, update, and maintain data files and to prepare necessary accounting reports, including:

- a transaction journal,
- a profit-and-loss or income report,
- an interim or monthly trial balance, and
- a balance sheet.

Even though the programs prompt you for input, operating the system parallels a standard manual accounting system, so an understanding of accounting fundamentals, while not strictly necessary, is a real plus.

The Business Accounting System uses Mark Data's Super Screen format for an enlarged, 51-character-by-24-line screen display (for a review of Super Screen, see *HOT CoCo*, January 1984, p. 40).

### The Heart of the Matter

The heart and soul of the Business Accounting System lies in the three data files: the system-support information, the chart-of-accounts totals, and the journal transactions. The remainder of the programs set up proper printer operation or let you read from or write to these three files.

The system support information includes the company name and address, the current date, and other general information for system housekeeping and preparation of reports. The file contains 25 records, although you only use records 1–17. This suggests that Mark Data is planning additional programs to expand this one.

The second file contains the chart of accounts, a numbered listing of all the accounts or categories used in the business's accounting. An account exists for all the types of transactions made, and the relationship among these accounts lets you keep complete and comprehensive track of your business transactions.

The chart of accounts is designed to be as general as possible, so as to accommodate many different types of business. Most small retail businesses should find the chart workable enough to prepare good reports and to generate data to be used at tax time. However, Mark Data has also made it possible for

# ★ COLOR COMPUTER WORD PROCESSOR ★

# Elite•Word™

## Also Available On OS-9

*THE SECOND GENERATION WORD PROCESSOR IS NOW... ELITE•WORD has many new features not found in other word processors for the Color Computer. ELITE•WORD is an all machine language, high performance, Full Screen Editor which offers an ease of use that is simply incredible. ELITE•WORD also offers a printed output flexibility that can handle your sophisticated home and business applications. ELITE•WORD is waiting to work for you.*

**MAJOR Features include:**

- **ALL Machine Language for speed**
- **Handsome Vinyl Binder**
- **Comprehensive Manual Included**
- **User Friendly (really)**
- **Top screen line reserved for command prompts, HELP messages, and status information**
- **Two text entry modes: Insert and Exchange**
- Edit 2 files simultaneously (OS-9 Only)
- Delete character under cursor
- Backspace and delete one character
- Delete entire screen line
- Rewrite entire screen
- Page Forward through text
- Page Backward through text
- Mark present line for automatic centering on output
- Insert new text (Insert mode)
- Type over old text (Exchange mode)
- Screen Display is 32x19 in normal text editing modes
- Screen Display is High-Res 64x19 when used to display final text; including page breaks and justification
- Screen Display in all modes is true Upper/Lower case characters with descenders
- Over 13.5K file size in 32K machines
- Continuous memory display
- Save text file (disk or tape)
- Load text file (disk or tape)
- All I/O errors trapped and recoverable
- Jump to beginning or end of text
- Find any string of characters in text
- Global replacement of one string in text for another
- **True block-text Move command**
- **Smooth cursor movement over text in any direction (including vertical)**
- **Smooth screen scroll for easier proof reading**
- **Auto Key-Repeat will automatically repeat any key that is held down**
- **Easy generation of ASCII files**
- **VIEW function permits high-res screen display of final text before it's printed; including right-side justification and page breaks**
- **VARIABLE TEXT MERGE allows for generation of standard form type letters that appear to be personally prepared for each reader**
- **INCLUDE feature (disk only) permits the inclusion of many other files within one large document. Total document will have sequential page numbering**
- **EXCELLENT FOR PROGRAM EDITING AND WORD PROCESSING.**

THE BEST FOR ONLY

Specify

| | |
|---|---|
| Tape | $59.95 |
| RS Disk | $59.95 |
| OS-9 Disk | $79.95 |
| OS-9 & RS Disk | $109.95 |

*— Shipping from stock NOW*

*— Dealer Inquiries Invited.*
*Add $2 Postage & Handling*
*PA residents add 6% sales tax*

MasterCard VISA

- **Type ahead keyboard buffer NEVER misses a character**
- **Optional screen display of all carriage returns <cr>**
- **Fast Disk I/O ... No loading of overlay files to slow program operation**
- **User HELP display available**
- **Automatic screen Word-Wrap; even while inserting new text**
- Block-text move, copy or delete
- Display/Change default disk drive number (disk only)
- Display disk directory (disk only)
- Display Free disk space available
- Software remembers last file name Saved or Loaded and will write to that file by default if desired
- Dynamic margin changes within text
- Select Top margin, Bottom margin, and Page length
- Choose number of duplicate copies
- Page Pause, for single sheet users, if desired
- Optional page numbering begins with any selected page number
- Printer Font codes are user definable
- All printer format options may be changed dynamically within text
- Any string of HEX characters may be imbedded within text to send any special control codes to your printer
- An Eject (top of form) command may be inserted within text
- Variable Text Merge symbols may be inserted anywhere within text
- All machine language; 32K and Extended Basic required for ROM-call routines

OS-9 is a trademark of Microware and Motorola.

## Elite Software

✓392

Box 11224 • Pittsburgh, PA 15238 • (412) 795-8492

> **"I was more than satisfied with Elite•Word. Before I started the review, I thought that it would be just another program that would copy most of what others had done and add a few whistles and bells. After the review, I would not hesitate to compare it with the two best selling CoCo word processors. And my comparison places it at the top of the list."**
> **- A. Buddy Hogan, Rainbow**

those more specialized enterprises to customize the chart of accounts as necessary.

The chart of accounts includes eight broad account classifications, with space for 99 subaccounts in each class. You can modify any of these except the account reserved for checking and the one that contains retained earnings.

The journal is the third important data file, and it contains all the daily transactions. It is like a checkbook register, in which each item and amount of income and payments are recorded in chronological order. In fact, for many small businesses, the journal is essentially the checkbook register.

When it's time to enter a transaction, the program first requests the account distribution (the account from which the amount is to be subtracted and the account to which it is to be added). A transactions program can move amounts from any account to any other. You don't need to worry about whether the amount is to be added or subtracted from any account, because the journal does that automatically, taking its information from the action associated with the major account divisions.

The journal transaction handles posting of checks just as it does any other transaction, but it automatically subtracts funds from the checking account. It also prompts for a check number.

Since the Business Accounting System is structured to be self-updating, once you've saved the journal entry, you must make any corrections as a separate transaction. Therefore, you can't go back and correct a bad journal entry. Rather, you must enter another journal transaction in the amount to offset the earlier error, preferably annotating it with a comment line to explain the error. This is proper accounting procedure.

## Taking Care of Business

When you first look at this system, you might feel that it's too complex to understand and has too many files to remember. But because it is interactive and menu driven, once you've established all the files and parameters on the system disk, daily posting and end-of-month activities are simple and step-by-step.

On a normal, daily basis you only need to post transactions to the journal and prepare the profit-and-loss and balance sheets periodically. Once you've posted the checks and receipts to the journal, the daily activities are done. But take Mark Data's advice and make a backup copy after you've added any data to your disk.

## Summary

The Business Accounting System is a serious, professional accounting program and well worth its price. The programs are complete and simple to use. They lead you effortlessly through the complexities of double-entry bookkeeping and protect you from error by a well-conceived array of subprograms. The screen system, although I hardly mentioned it, provides a pleasant working environment and expands the screen to a reasonable width while maintaining character readability.

There is a further reason to buy this system: Mark Data Products has a complete small-business order-entry system that is compatible with the accounting system. That means you needn't search for other programs (which probably won't be compatible anyway) to do your business paperwork chores.

Most small-business owners aren't accountants, nor are they computer hackers. Therefore, the Business Accounting System steps in where your free time and experience leave off. ■

PRO-COLOR-FILE
*ENHANCED*
✓35

**PRO-COLOR-FILE** has become one of the most respected database programs ever developed for the Color Computer. Whether it's for home or business, **PRO-COLOR-FILE** lets you design your own sophisticated database tailored to your needs.

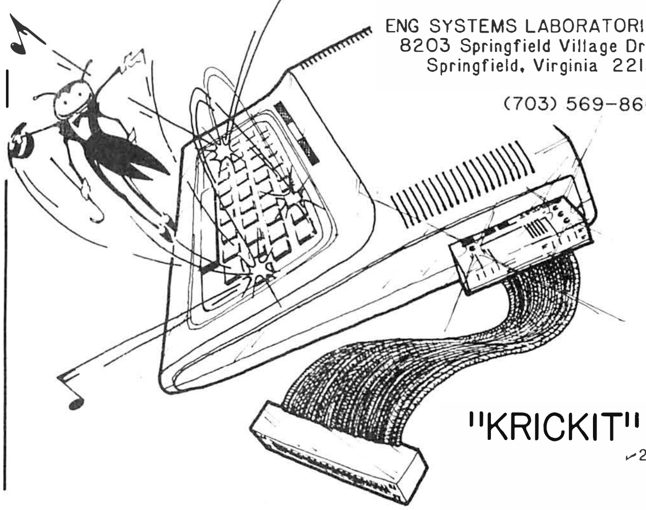
**60 DATA FIELDS** available for each record to store information
**1020 BYTES** for each record can be used if needed
**1 - 4 DISK DRIVES** can be used to maximize storage capacity
**4 COLOR DATA ENTRY** screens can be custom designed
**28 MATH EQUATIONS** can be setup to perform calculations
**POST ACCOUNTS** routine performs calculations on an entire file
**DUPLICATE RECORDS or FIELDS** from previous entries
**SORT ENTIRE FILE** on 3 fields at one time
**SORT ANY SIZE FILE** whether it's 200 or 2000 records
**SELECT SUB-SETS** of file for sorting or reporting
**SCAN FILES** alphabetical by any field
**SUMMARIZE FILES** to find totals, averages, low and hi values
**8 REPORT FORMATS** for obtaining hard or soft copy reports
**6 LABEL FORMATS** for 1 to 10 across labels & 1 to 30 lines/label
**PASSWORD PROTECTION** for limited access to data and reports

**PRO-COLOR-FILE** was so well received that over 70% of the owners of the original version ordered the **PRO-COLOR-FILE *ENHANCED*** upgrade in the first 2 weeks of its introduction. Find out for yourself why people in almost every state, Canada, South America, and even the Far East and Europe have turned to **PRO-COLOR-FILE *ENHANCED*** for their information management needs.

PRO-COLOR-FILE *ENHANCED* **$79.95**

See your local dealer or send check or money order to:
**DERRINGER SOFTWARE, INC., P.O. Box 5300, Florence, South Carolina 29502.** Visa/MC customers call (803)665-5676
Add $3.50 S&H - Available on AMDISK (Add $5.00).
S.C. residents add required sales tax.

IS YOUR COMPUTER IGNORING YOU ???



ENG SYSTEMS LABORATORIES
8203 Springfield Village Drive
Springfield, Virginia 22152

(703) 569-8660

"KRICKIT"
✓23

You've just typed in the Gettysburg Address and now you see that your computer only heard every other word!

THE KRICKIT CHIRPS ONLY WHEN YOUR COMPUTER HAS CAUGHT THE KEY. With the Krickit, there is no wasted effort pounding keys to make sure they contact or looking at the screen after every character. You can keep your eyes on the listing and not lose your place.

Works great with text editors and DBM's (Telewriter-64 and Homebase, to name a few) or when entering programs with just the BASIC line-editor in your computer. Just plugs in! Needs no software or hardware modifications. Built-in speaker! Uses no CPU time! Your computer has better things to do than sound key beeps.

The Krickit has other valuable features, too. A convenient switch controls the Cartridge Interrupt line. Instead of clumsy, messy tape on fingers 7 or 8, just flip the switch to access Basic with a game pak installed. It also has a more accessible reset switch, lighted power indicators, gold edge-fingers and an extension cable.

We are sure that after you try the Krickit you will never want to be without it. Take 30 days to decide you like it or return it for a full refund. 24-hour order line. Order yours today for only $59.95 (plus shipping and handling). COD, Visa, and Mastercard accepted.

# HOT PROGRAMS IN AN INSTANT

NEW
$9.97
instant
CoCo
Programs From HOT CoCo

Finally! Great programs you can load and run in seconds. You'll save hours of keyboarding time and build a terrific library of useful programs for as little as $10.00 a month.

Get the best programs from HOT CoCo magazine... ready to run...for pennies. All the directions or help you need is in your copy of HOT CoCo.

**instant CoCo** gives you ...*action-packed games—have your own video game entertainment center!

*useful applications—programs for education, business, home and hobby, to delight the whole family.

*utilities—your routine tasks will be taken care of like magic plus you'll be expanding the capabilities of your computer.

Order **instant CoCo** cassettes by the month. Every cassette guarantees you ten to fifteen great programs for only $11.47.*

Save money! A full twelve month subscription is yours for only $99.97*. That's only $8.33 per cassette.

You'll want the "Best of 83."

Over 33 programs from the 1983 issues of HOT CoCo magazine. You'll have a valuable library...for only-$16.47*...less than .45 cents per program.

Order your subscription to **instant CoCo** today!

Mail the coupon below or call TOLL FREE 1-800-258-5473 and use your Visa, Mastercard or American Express. In New Hampshire call 1-924-9471.

**instant CoCo** lets you start having fun right away...almost like magic!

**YES!** I want programs in an instant... I want instant CoCo

☐Please send me____copies of the "Best of '83" at $16.47 each.

☐Please send me ____copies of this month's issue at $11.47 each.

☐Please sign me up for a one year subscription beginning with this month's issue at $99.97

*Price includes postage and handling. Foreign Air Mail please add an additional 45¢ per cassette or $25 per subscription. US funds drawn on US banks ONLY.

☐CHECK/MO ☐MC ☐VISA ☐AE

Card# ________________ Exp. Date ______

Signature ____________________

Name ____________________

Address ____________________

City ____________ State _____ Zip _____

Please allow 6–8 weeks delivery.

**instant CoCo • 80 Pine Street • Peterborough, NH 03458**

IC8406

BY MARK D. GOODWIN

# JOURNEY TO THE CENTER OF THE ROM—PART VIII

What are the secrets of the DIM command? Or of the STR$ command? How much can you learn from knowing the inner workings of Color Basic's string-handling routines? These and other ROM areas are covered this month in our continuing disassembly of the Color Basic ROM. This part deals with locations B34B to B6CE.—*eds.*

---

*Address correspondence to Mark Goodwin, Star Route 79, Box 103, Orland, ME 04472.*

### B34B-B356 Color Basic DIM Command

| | |
|---|---|
| B34B-B34D | Check the syntax |
| B34E-B34F | B = create value |
| B350-B351 | Create the array |
| B352-B353 | Get the next character |
| B354-B355 | Loop until the end of the Basic statement |
| B356 | Return |

### B357-B3A1 Locate/Create Variable Routine

| | |
|---|---|
| B357 | B = locate value |
| B358-B359 | Get the next character |
| B35A-B35B | Save the locate/create flag |
| B35C-B35D | Save the first character of the variable name |
| B35E-B35F | Get the character |
| B360-B361 | Alphabetic? |
| B362-B365 | Display SN error message if it isn't alphabetic |
| B366 | B = numeric NTF value |
| B367-B368 | NTF = numeric |
| B369-B36A | Get the next character |
| B36B-B36C | Jump if it's numeric |
| B36D-B36E | Alphabetic? |
| B36F-B370 | Jump if it isn't alphabetic |
| B371-B372 | B = second character |
| B373-B374 | Get the next character |
| B375-B376 | Loop if it's numeric |
| B377-B378 | Alphabetic? |
| B379-B37A | Loop if it's alphabetic |
| B37B-B37C | Dollar sign? |
| B37D-B37E | Jump if it isn't a dollar sign |
| B37F-B380 | NTF = string |
| B381-B382 | Set bit 7 of the second character |
| B383-B384 | Get the next character |
| B385-B386 | Save the second character |
| B387-B388 | Mask the character in A |
| B389-B38A | Left parenthesis? |
| B38B-B38E | Jump if it's an array |
| B38F-B390 | Clear the mask |
| B391-B392 | X = start of the simple-variables pointer |
| B393-B394 | D = variable name |
| B395-B396 | All simple variables checked? |
| B397-B398 | Jump if all the simple variables have been checked |
| B399-B39B | Variable names match? |
| B39C-B39D | Jump if they match |
| B39E-B39F | Bump the memory pointer to the next variable |
| B3A0-B3A1 | Loop until done |

### B3A2-B3AA Check-for-Alphabetic-Character Routine

| | |
|---|---|
| B3A2-B3A3 | Character < A? |
| B3A4-B3A5 | Return if character < A |
| B3A6-B3A9 | Set carry if character > Z |
| B3AA | Return |

### B3AB-B3DE Create-Simple-Variable Routine

| | |
|---|---|
| B3AB-B3AD | X = zero pointer |
| B3AE-B3AF | U = return address |
| B3B0-B3B3 | Return address = B287? |
| B3B4-B3B5 | Jump if this routine was called from B287 |
| B3B6-B3B7 | D = start of free-memory pointer |
| B3B8-B3B9 | Save it |
| B3BA-B3BC | Figure the new free-memory pointer |
| B3BD-B3BE | Save it |
| B3BF-B3C0 | X = start of the array-variables pointer |
| B3C1-B3C2 | Save it |
| B3C3-B3C5 | Move the array variables |
| B3C6-B3C7 | X = new free-memory pointer |
| B3C8-B3C9 | Save it |
| B3CA-B3CB | X = new start of the array-variables pointer |
| B3CC-B3CD | Save it |
| B3CE-B3CF | X = address of the new variable |
| B3D0-B3D1 | D = variable name |
| B3D2-B3D3 | Save it |
| B3D4 | Zero A |
| B3D5 | Zero B |
| B3D6-B3D7 | Zero the EXP and the MSB |
| B3D8-B3D9 | Zero the NMSB and the NNMSB |
| B3DA-B3DB | Zero the LSB |
| B3DC-B3DD | Save the VARPTR |
| B3DE | Return |

### B3DF-B3E3 Floating-Point Constant Equal to −32768

*Listing continued*

*Listing continued*

## B3E4–B400 Evaluate-Array-Subscript Routine

| | |
|---|---|
| B3E4–B3E5 | Get the next character |
| B3E6–B3E8 | Evaluate the expression |
| B3E9–B3EA | A = (SF1) |
| B3EB–B3EC | Jump if the result is negative |
| B3ED–B3EE | A = (EXP1) |
| B3EF–B3F0 | Integer range? |
| B3F1–B3F2 | Jump if it's an integer |
| B3F3–B3F5 | X = floating-point constant – 32768 pointer |
| B3F6–B3F8 | FPAC1 = – 32768? |
| B3F9–B3FA | Display FC error message if FPAC1<> – 32768 |
| B3FB–B3FD | Convert FPAC1 to an integer |
| B3FE–B3FF | D = integer result |
| B400 | Return |

## B401–B4CD Locate/Create-Array-Variable Routine

| | |
|---|---|
| B401–B402 | B = locate/create flag |
| B403–B404 | A = NTF |
| B405–B406 | Save the locate/create flag and the NTF |
| B407 | Number of subscripts = 0 |
| B408–B409 | X = variable name |
| B40A–B40B | Save the number of subscripts and the variable name |
| B40C–B40D | Evaluate the subscript |
| B40E–B40F | Get the number of subscripts, the variable name, the locate/create flag, and the NTF |
| B410–B411 | Save the variable name |
| B412–B413 | U = subscript |
| B414–B415 | Save the locate/create flag, the NTF, and the subscript |
| B416 | Bump the number of subscripts |
| B417–B418 | Get the next character |
| B419–B41A | Comma? |
| B41B–B41C | Loop if it's a comma |
| B41D–B41E | Save the number of subscripts |
| B41F–B421 | Check the syntax |
| B422–B423 | Get the NTF and the locate/create flag |
| B424–B425 | Save the NTF |
| B426–B427 | Save the locate/create flag |
| B428–B429 | X = start of the array-variables pointer |
| B42A–B42B | All array variables checked? |
| B42C–B42D | Jump if all the array variables have been checked |
| B42E–B42F | D = variable name |
| B430–B432 | Variable names match? |
| B433–B434 | Jump if they match |
| B435–B436 | D = offset to the next array |
| B437–B438 | Update the memory pointer |
| B439–B43A | Loop until done |
| B43B–B43C | B = DD error code |
| B43D–B43E | A = locate/create flag |
| B43F–B440 | Display DD error message if create |
| B441–B442 | B = number of subscripts |
| B443–B444 | Compare the number of subscripts |
| B445–B446 | Jump if the number of subscripts match |
| B447–B448 | B = BS error code |
| B449–B44B | Ignore |
| B44A–B44B | B = FC error code |
| B44C–B44E | Display the error message |
| B44F–B451 | D = locate/create flag and NTF |
| B452–B453 | Save them |
| B454–B455 | D = variable name |
| B456–B457 | Save it |
| B458–B459 | B = number of subscripts |
| B45A–B45B | Save it |
| B45C–B45E | Do memory check |
| B45F–B460 | Save the array-variables pointer |
| B461–B462 | B = default number of elements |
| B463 | D = default number of elements |
| B464–B465 | Locate? |
| B466–B467 | Jump if locate |
| B468–B469 | Get the number of elements |
| B46A–B46C | Bump it |
| B46D–B46E | Save it |
| B46F–B470 | Do 16-bit multiplication |
| B471–B472 | Save the number of elements |
| B473–B474 | Bump the array-variables pointer |
| B475–B476 | More subscripts? |
| B477–B478 | Loop if there are any more subscripts |
| B479–B47A | Save the start of the array elements |
| B47B–B47C | Add the offset to the start of the array elements |
| B47D–B480 | Display OM error message if overflow |
| B481–B482 | X = array pointer |
| B483–B485 | Do memory check |
| B486–B488 | Adjust the array pointer |
| B489–B48A | Save the new free-memory pointer |
| B48B | Zero A |
| B48C–B48D | Decrement the array pointer |
| B48E–B48F | Zero the element |
| B490–B491 | Array zeroed? |
| B492–B493 | Loop until it is all zeros |
| B494–B495 | X = array pointer |
| B496–B497 | X = MSB of the start of the free-memory pointer |
| B498–B499 | Figure the offset to the next array |
| B49A–B49B | Save it |
| B49C–B49D | Create? |
| B49E–B49F | Jump if create |
| B4A0–B4A1 | B = number of subscripts |
| B4A2–B4A3 | Save it |
| B4A4 | Zero A |
| B4A5 | Zero B |
| B4A6–B4A7 | Save the total number of elements |
| B4A8–B4A9 | Get the next subscript |
| B4AA–B4AB | Save the number of elements |
| B4AC–B4AE | Elements out of range? |
| B4AF–B4B0 | Jump if the elements are out of range |
| B4B1–B4B2 | U = offset |
| B4B3–B4B4 | Jump if it's the first subscript |
| B4B5–B4B6 | Do 16-bit multiplication |
| B4B7–B4B8 | Add in the number of elements |
| B4B9–B4BA | Bump the array pointer |
| B4BB–B4BC | Any more subscripts? |
| B4BD–B4BE | Loop if there are any more subscripts |
| B4BF–B4C0 | Save the number of elements |
| B4C1–B4C2 | D = D*2 |
| B4C3–B4C4 | D = D*4 |
| B3C5–B4C6 | D = D*5 |
| B4C7–B4C8 | Add the offset to the array pointer |
| B4C9–B4CA | Point to the element |
| B4CB–B4CC | Save the VARPTR |
| B4CD | Return |

## B4CE–B4ED 16-Bit Unsigned Multiplication

| | |
|---|---|
| B4CE–B4CF | A = number of times to multiply |
| B4D0–B4D1 | Save it |
| B4D2–B4D3 | D = number of elements |
| B4D4–B4D5 | Save it |
| B4D6–B4D7 | Total = 0 |
| B4D8–B4D9 | Shift the result |
| B4DA–B4DB | Jump if overflow |
| B4DC–B4DF | Shift the number of elements |
| B4E0–B4E1 | Jump if no add |
| B4E2–B4E3 | Add the number of elements |
| B4E4–B4E5 | Jump if overflow |
| B4E6–B4E7 | Multiplication done? |
| B4E8–B4E9 | Loop until the multiplication is done |
| B4EA | Return |
| B4EB–B4ED | Display BS error message |

## B4EE–B4FC Color Basic MEM Command

| | |
|---|---|
| B4EE–B4EF | D = stack pointer |
| B4F0–B4F1 | Figure the amount of free memory |
| B4F2–B4F3 | Ignore |
| B4F3 | Make D an integer |
| B4F4–B4F5 | NTF = numeric |
| B4F6–B4F7 | Save the integer as (MSB1) and (NMSB1) |
| B4F8–B4F9 | B = exponent |
| B4FA–B4FC | Make FPAC1 floating point |

## B4FD–B50C Color Basic STR$ Command

| | |
|---|---|
| B4FD–B4FF | Check for a TM error |
| B500–B502 | U = ASCII buffer pointer |
| B503–B505 | Convert FPAC1 to an ASCII string |
| B506–B507 | Clean up the stack |
| B508–B50A | X = start of the ASCII string – 1 |
| B50B–B50C | Build a string entry |

*Listing continued*

*Listing continued*

### B50D–B515 Open-Up-String-Space Routine

| | |
|---|---|
| B50D–B50E | Save the end-of-the-string pointer |
| B50F–B510 | Make room in string space |
| B511–B512 | Save the string-storage address |
| B513–B514 | Save the string length |
| B515 | Return |

### B516–B56C Build-String-Entry Routine

| | |
|---|---|
| B516–B517 | Decrement the string pointer |
| B518–B519 | Character = quote? |
| B51A–B51B | Save the string delimiter |
| B51C–B51D | Save the string delimiter |
| B51E–B51F | Bump the string pointer |
| B520–B521 | Save the string pointer |
| B522–B523 | Save the string pointer |
| B524–B525 | B = starting string length |
| B526 | Bump the string length |
| B527–B528 | A = next character |
| B529–B52A | Jump if it's a null |
| B52B–B52C | Delimiter? |
| B52D–B52E | Jump if it's a delimiter |
| B52F–B530 | Delimiter? |
| B531–B532 | Loop if it isn't a delimiter |
| B533–B534 | Quote? |
| B535–B536 | Jump if it's a quote |
| B537–B538 | Decrement the end-of-the-string pointer |
| B539–B53A | Save it |
| B53B–B53C | Save the string length |
| B53D–B53E | U = start of the string pointer |
| B53F–B542 | String in the buffers? |
| B543–B544 | Jump if it isn't in the buffers |
| B545–B546 | Open up string space |
| B547–B548 | X = start of the string pointer |
| B549–B54B | Move the string into string space |
| B54C–B54D | X = next available location in the temporary-string-area pointer |
| B54E–B550 | Temporary string area full? |
| B551–B552 | Jump if it isn't full |
| B553–B554 | B = ST error code |
| B555–B557 | Display ST error message |
| B558–B559 | A = string length |
| B55A–B55B | Save it in the temporary string area |
| B55C–B55D | D = string address |
| B55E–B55F | Save it in the temporary string area |
| B560–B561 | A = string NTF |
| B562–B563 | NTF = string |
| B564–B565 | Save the string VARPTR as the last entry in the temporary-string-area pointer |
| B566–B567 | Save the string VARPTR in FPAC1 |
| B568–B569 | Bump the temporary-string-area pointer |
| B56A–B56B | Save the new next available location in the temporary-string-area pointer |
| B56C | Return |

### B56D–B60E Open-Up-String-Space Routine

| | |
|---|---|
| B56D–B56E | Flag string space not open |
| B56F | D = number of bytes to open up string space |
| B570–B571 | Save the string length |
| B572–B573 | D = next available location in string space |
| B574–B575 | Figure the string storage address |
| B576–B578 | Below the start of string space? |
| B579–B57A | Jump if it's below the start of string space |
| B57B–B57C | Save the new next available location in string-space pointer |
| B57D–B57E | X = next available location in string-space pointer |
| B57F–B580 | Bump it to the string-storage address |
| B581–B582 | Save the string-storage address |
| B583–B584 | Get the string length and return |
| B585–B586 | B = OS error code |
| B587–B588 | String space already open? |
| B589–B58A | Display OS error message if string space is open |
| B58B–B58C | Open up string space |
| B58D–B58E | Get the string length |
| B58F–B590 | Try again |
| B591–B592 | X = end of the string-space pointer |
| B593–B594 | Save it as the next available location in string-space pointer |
| B595–B596 | D = dummy string VARPTR |
| B597–B598 | Save it |
| B599–B59A | X = start of the string-space pointer |
| B59B–B59C | Save it |
| B59D–B59F | X = start of the temporary-string-area pointer |
| B5A0–B5A1 | All the temporary strings checked? |
| B5A2–B5A3 | Jump if all the temporary strings have been checked |
| B5A4–B5A5 | Check to see if this string must be moved |
| B5A6–B5A7 | Loop |
| B5A8–B5A9 | X = start of the simple-variables-area pointer |
| B5AA–B5AB | All the simple variables checked? |
| B5AC–B5AD | Jump if all the simple variables have been checked |
| B5AE–B5AF | Check to see if this string must be moved |
| B5B0–B5B1 | Loop |
| B5B2–B5B3 | Save the start of the array-variables pointer |
| B5B4–B5B5 | X = start of the array-variables pointer |
| B5B6–B5B7 | All the array variables checked? |
| B5B8–B5B9 | Jump if all the array variables have been checked |
| B5BA–B5BB | D = offset the next array |
| B5BC–B5BD | D = start of the next array |
| B5BE–B5BF | Save it |
| B5C0–B5C1 | A = second character of the variable name |
| B5C2–B5C3 | Loop if the array is numeric |
| B5C4–B5C5 | B = number of subscripts |
| B5C6 | B = number of subscripts times 2 |
| B5C7–B5C8 | B = offset to the array elements |
| B5C9 | X = start of the array elements |
| B5CA–B5CB | All the elements checked? |
| B5CC–B5CD | Loop if all the elements have been checked |
| B5CE–B5CF | Check to see if this string must be moved |
| B5D0–B5D1 | Loop |
| B5D2–B5D3 | A = second character of the variable name |
| B5D4–B5D5 | X = string VARPTR |

*Listing continued*

FREE OFFER!

COMPUTER CASSETTES 58¢

*FREE "Great Inventions Game Cassette" with each order of 20 or more C-10's*
Specify TRS-80 Color Computer, MC-10, TI-99/4A
VIC 20 or Commodore 64

- C-10 Length
- 5 Screw Shell / Free Labels
- Lifetime money back guarantee
- Storage Box add 12¢ each
- $2.00 shipping charge - any quantity (Canadian Orders $6.00 shipping)
- NJ Residents add 6% Sales Tax.
- Send check or money order to:

PARALLEL SYSTEMS
Box 772 - Dept. H
Blackwood, NJ 08012
609-227-9634

✓207

# SUPER PRO KEYBOARD

Radio Shack
TRS-80
COLOR COMPUTER

Computers produced after approximately October 1982 require an additional plug adaptor please add $4.95.

- **Only $69.95**
- Original key layout.
- No special software required.
- Fast, simple installation—no soldering.
- Individually boxed with full instructions.
- Professional, low profile, finished appearance.
- U.S. made—high quality, quad gold contacts.
- Smooth "Touch Typist" feel—no sagging.

**Rainbow, April '83**

A fine piece of hardware from Mark Data Products...It is super and it is professional too...If you are searching for a replacement keyboard, it is an excellent buy...

**Hot CoCo, August '83**

Like putting leather upholstery in your Volkswagen...Very impressed with the appearance and performance...Could easily pass as original equipment...Installation is very simple...

**Color Computer Magazine, June '83**

The installation procedure is well detailed and quite simple...Has a professional feel, reacts well to the touch... has held up to some purposeful pounding...

**Color Computer News, June '83**

Mark Data Products is well known to us "longtimers"... Every bit as finished as if Tandy had done it...The Mark Data Super-Pro is your best buy...The one that is in my CoCo to stay ..

## Great Computer Software Also

• Adventure Games • Arcade Games and Utility Software

MD

**Mark Data Products**

24001 ALICIA PKWY., NO. 207 • MISSION VIEJO, CA 92691 • (714) 768-1551

All Orders: Please add $2.00 shipping and handling in the continental U.S. All others, add air shipping and $3.00 handling. California residents add 6% sales tax. Foreign orders please remit U.S. funds. Software authors—contact us for exciting program marketing details.

*Listing continued*

| | |
|---|---|
| B5D6–B5D7 | Jump if the variable is numeric |
| B5D8–B5D9 | B = string length |
| B5DA–B5DB | Jump if it's a null string |
| B5DC–B5DD | D = string address |
| B5DE–B5E0 | String in the new string area? |
| B5E1–B5E2 | Jump if it's in the new string area |
| B5E3–B5E5 | String in the program? |
| B5E6–B5E7 | Jump if it's in the program |
| B5E8–B5E9 | Save the string VARPTR |
| B5EA–B5EB | Save the string address |
| B5EC–B5ED | Bump to the next string |
| B5EE | Return |
| B5EF–B5F0 | X = string VARPTR |
| B5F1–B5F2 | Jump if no strings have to be moved |
| B5F3 | Zero A |
| B5F4–B5F5 | D = string length |
| B5F6 | D = string length minus 1 |
| B5F7–B5F8 | D = start of string-space plus the string length |
| B5F9–B5FA | Save it |
| B5FB–B5FC | X = next available location in string-space pointer |
| B5FD–B5FE | Save it |
| B5FF–B601 | Move the string |
| B602–B603 | X = string VARPTR |
| B604–B605 | D = new string address |
| B606–B607 | Save it |
| B608–B609 | X = next available location in string-space pointer |
| B60A–B60B | Adjust it |
| B60C–B60E | Loop until done |

## B60F–B642 String-Concatenation Routine

| | |
|---|---|
| B60F–B610 | D = string1 VARPTR |
| B611–B612 | Save it |
| B613–B615 | Evaluate the expression |
| B616–B618 | Check for a TM error |
| B619–B61A | Get the string1 VARPTR |
| B61B–B61C | Save it |
| B61D–B61E | B = string1 length |
| B61F–B620 | X = string2 VARPTR |
| B621–B622 | B = string1 length plus string2 length |
| B623–B624 | Jump if it doesn't overflow |
| B625–B626 | B = LS error code |
| B627–B629 | Display LS error message |
| B62A–B62C | Open up string space |
| B62D–B62E | X = string1 VARPTR |
| B62F–B630 | B = string1 length |
| B631–B632 | Move string1 into string space |
| B633–B634 | X = string2 VARPTR |
| B635–B636 | Get the string2 address |
| B637–B638 | Move string2 into string space |
| B639–B63A | X = string1 VARPTR |
| B63B–B63C | Clean up string space |
| B63D–B63F | Clean up the temporary string area |
| B640–B642 | Loop until done |

## B643–B653 Move-String-into-String-Space Routine

| | |
|---|---|
| B643–B644 | X = string address |
| B645–B646 | U = string storage address |
| B647 | Bump the string length |
| B648–B649 | Jump |
| B64A–B64B | A = next string character |
| B64C–B64D | Save it in string space |
| B64E | String move done? |
| B64F–B650 | Loop until the string move is done |
| B651–B652 | Save the string ending address |
| B653 | Return |

## B654–B674 Clean-Up-String-Space-Routine

| | |
|---|---|
| B654–B656 | Check for a TM error |
| B657–B658 | X = string VARPTR |
| B659–B65A | B = string length |
| B65B–B65C | Clean up the temporary string area |
| B65D–B65E | Jump if it wasn't in the temporary string area |
| B65F–B660 | X = string address |
| B661–B662 | Decrement it |
| B663–B664 | Last entry in string space? |
| B665–B666 | Jump if it isn't the last entry in string space |
| B667–B668 | Save the string length |
| B669–B66A | Adjust the next available location in the string-space pointer |
| B66B–B66C | Save it |
| B66D–B66E | Get the string length |
| B66F–B670 | Bump the string address |
| B671 | Return |
| B672–B673 | X = string address |
| B674 | Return |

## B675–B680 Clean-Up-the-Temporary-String-Area Routine

| | |
|---|---|
| B675–B676 | Last entry in the temporary string area? |
| B677–B678 | Jump if it isn't the last entry in the temporary string area |
| B679–B67A | Save the new next available location in the temporary-string-area pointer |
| B67B–B67C | Bump the pointer over the string VARPTR |
| B67D–B67E | Save the last entry in the temporary-string-area pointer |
| B67F | Zero A |
| B680 | Return |

## B681–B685 Color Basic LEN Command

| | |
|---|---|
| B681–B682 | B = string length |
| B683–B685 | Save B as the current result |

## B686–B68B String Routine

| | |
|---|---|
| B686–B687 | X = string address and B = string length |
| B688–B689 | NTF = numeric |
| B68A | Set the flags for the string length |
| B68B | Return |

## B68C–B69F Color Basic CHR$ Command

| | |
|---|---|
| B68C–B68E | Get the ASCII value |
| B68F–B690 | B = string length |
| B691–B693 | Open up string space |
| B694–B695 | A = ASCII value |
| B696–B698 | Save the string values |
| B699–B69A | Save the ASCII value as the string |
| B69B–B69C | Clean up the stack |
| B69D–B69F | Adjust the string pointers |

## B6A0–B6AA Color Basic ASC Command

| | |
|---|---|
| B6A0–B6A1 | B = first string character |
| B6A2–B6A3 | Save B as the current result |
| B6A4–B6A5 | X = string address and B = string length |
| B6A6–B6A7 | Display FC error message if it's a null string |
| B6A8–B6A9 | B = first string character |
| B6AA | Return |

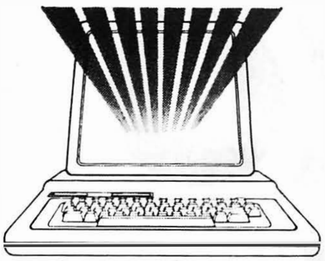
## B6AB–B6C7 Color Basic LEFT$ Command

| | |
|---|---|
| B6AB–B6AC | X = string address and B = string length |
| B6AD | String offset = 0 |
| B6AE–B6AF | New string length <= old string length? |
| B6B0–B6B1 | Jump if the new string length <= the old string length |
| B6B2–B6B3 | B = string length |
| B6B4 | String offset = 0 |
| B6B5–B6B6 | Save the string offset and the new string length |
| B6B7–B6B9 | Open up string space |
| B6BA–B6BB | X = string VARPTR |
| B6BC–B6BD | X = string address |
| B6BE–B6BF | Get the string offset |
| B6C0 | Adjust the string address |
| B6C1–B6C2 | Get the new string length |
| B6C3–B6C5 | Move the string |
| B6C6–B6C7 | Adjust the string pointers |

## B6C8–B6CE Color Basic RIGHT$ Command

| | |
|---|---|
| B6C8–B6C9 | X = string VARPTR, A = new string length, and B = new string length |
| B6CA–B6CB | Figure the string offset |
| B6CC | Make it positive |
| B6CD–B6CE | Use the LEFT$ code■ |

# SUPER SCREEN



- **A big 51 character by 24 line screen.**
- **Full upper and lower case characters.**
- **Easily combine text with hi-res graphics.**
- **PRINT @ is completely functional on the big screen.**
- **The powerful ON ERROR GOTO is fully implemented.**
- **Auto-key repeat for greater keyboard convenience.**
- **Control codes for additional functions.**
- **Works with 16K, 32K or 64K computers.**
- **Available on disc or cassette.**
- **Works with extended and/or disc BASIC.**

### 51 CHARACTERS BY 24 LINE DISPLAY

Super Screen is a powerful, machine language program that significantly upgrades the performance and usefulness of 16K or greater, Extended and Disc Basic Color Computers. The standard Color Computer display screen is totally inadequate for serious, personal or business applications so Super Screen replaces it with a brand new, 51 character wide by 24 line screen including full upper and lower case characters. Instead of a confusing checkerboard appearance, you now have true lower case letters along with a screen that is capable of displaying 1224 characters. The difference is startling! Your computer takes on new dimensions and can easily handle lines of text that were simply too long and complex to display on the old screen.

### COMBINE TEXT WITH HI-RES GRAPHICS

You can now write truly professional looking programs that combine text with hi-res graphics. Super Screen allows you to create graphics displays with the Basic LINE, DRAW and CIRCLE statements and then notate the graphics with descriptive text. You can even use PRINT @ if you wish for greater programming convenience. Super Screen's versatility will amaze you.

### PRINT @ IS FULLY IMPLEMENTED

The PRINT @ statement is a valuable asset to the programmer when formatting text on the screen. The standard Color Computer will report an error if you specify a location higher than 511 but Super Screen allows locations all the way to 1223! You get a big screen and a powerful formatting tool as well. Of course, Super Screen also supports the CLS command allowing you to clear the big screen using standard Basic syntax.

### ON ERROR GOTO

That's right! Super Screen gives you a full implementation of ON ERROR GOTO including the ERR and ERL functions. Now you can trap errors and take corrective action to prevent crashed programs and lost data using the same standard syntax as other computers. The ON ERROR GOTO capability overcomes a serious deficiency of Color Computer Basic and greatly improves your capability to handle sophisticated tasks. All well written, 'user friendly' programs use error trapping techniques and yours can too! Now that's power!

### AUTO KEY REPEAT

No more frustration as you edit a long line in your Basic program; just hold the space bar down and automatically step to the desired position in the line. Need a line of asterisks? Hold the key down and auto repeat will give them to you. Those of you who spend many hours at your keyboard will appreciate this outstanding addition to Super Screen's long list of impressive capabilities.

### CONTROL CODES FOR ADDITIONAL FUNCTIONS

Super Screen recognizes several special control code characters that allow selection of block or underline, solid or blinking cursor and other functions. You can 'Home Up' the cursor or you may erase from the cursor to the end of a line or to the end of the screen just like many other computers. These special codes give you an extra dimension of versatility and convenience that put Super Screen in a class by itself.

### AND MORE GOOD NEWS...

Super Screen comes with complete, well detailed instructions and is available on cassette or disc. It adjusts automatically to any 16K or greater, Extended or Disc Basic Color Computer or TDP-100 and uses only 2K of memory in addition to the screen memory reserved during power up. Guaranteed to be the most frequently used program in your software library...once you use it, you won't be without it! Super Screen's low price will really please you; only $29.95 on cassette or $32.95 on disc!

## 64K Memory Expansion Kit

All parts and complete instructions

**$64.95**

## ACCOUNTING SYSTEM

The Mark Data Products accounting system is ideal for the small businessman needing a fast, efficient means to process income and expenses, prepare detailed reports and maintain most of the information required at tax time. The system is a family of programs which operate by means of a "menu" selection scheme. When the operator selects a task to perform, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary accounting reports including a transaction journal, a P&L or income report, an interim or trial balance and a balance sheet.

Up to 255 separate accounts may be defined and a single disc system can hold over 1,400 transactions. This system automatically enhances the monitor screen to a 51 character by 24 line display. 32K of memory is required along with an 80-column printer and one or more disc drives.

The MDP system:

- Is accurate, user friendly and simple to use.
- Is easy to customize for specific user requirements.
- Immediately updates the chart of accounts.
- Provides an audit trail.
- Includes end of period procedures.
- Is capable of future expandability.

This accounting software equals or exceeds higher priced packages for other computers and includes a detailed operating manual.

Requires 32K and a Single Disc Drive
PRICE: $99.95

## ORDER ENTRY SYSTEM

The Mark Data Products sales order processing system provides a fast, efficient means to enter orders, print shipping papers and invoices, prepare sales reports, and monitor receivables. The system automatically enhances the monitor screen to a 51 character by 24 line display. 32K of memory is required along with an 80-column printer, and one or more disc drives.

The MDP order entry system is a family or programs which operate interactively by means of a "menu" selection scheme. Up to 900 products may be defined and a single disc system can hold over 600 transactions. When the operator selects a task to be performed, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary paperwork including shipping and invoice forms, daily sales reports, a monthly (or other period) sales report and a receivables report.

The MDP system:

- Is accurate, user friendly and simple to use.
- Is easy to customize for specific user requirements.
- Produces a traceable invoice.
- Handles receivables as well as closed orders.
- Is capable of future expandability.

This order entry software equals or exceeds higher priced packages for other computers and includes a detailed operating manual.

Requires 32K and a Single Disc Drive
PRICE: $99.95

### THE MARK DATA PRODUCTS

## SUPER PRO KEYBOARD...

The most popular replacement keyboard for your CoCo.

- Original key layout
- No special software required.
- Fast, simple installation—no soldering.
- Individually boxed with full instructions.
- Professional, low profile, finished appearance.
- U.S. made—high quality, quad gold contacts.
- Smooth "Touch Typist" feel—no sagging.

Only $69.95

## IMPORTANT NEW BOOKS

"Your Color Computer" by Doug Mosher. Over 300 pages of detailed information—A CoCo encyclopedia. $12.95.

"Programming the 6809" by Rodnay Zaks and William Labiak. One of the best 6809 machine language texts available—required reference material. $15.95.

## WE STOCK SOFTLAW PRODUCTS

The VIP WRITER Text Processor is rated tops by Rainbow, Hot CoCo and Color Computer Magazine. After evaluation we rate it tops too. **Disc $59.95.**

MD

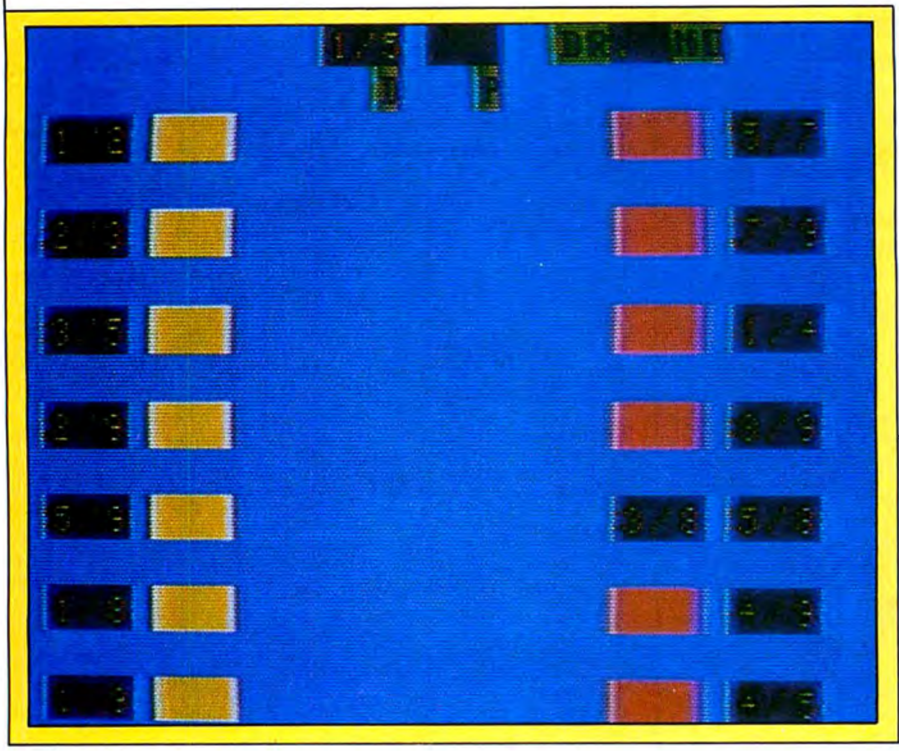
# Mark Data Products

24001 ALICIA PKWY., NO. 207 • MISSION VIEJO, CA 92691 • (714) 768-1551

All Orders: Please add $2.00 shipping and handling in the continental U.S. All others, add air shipping and $3.00 handling. California residents add 6% sales tax. Foreign orders please remit U.S. funds. Software authors—Contact us for exciting program marketing details. We accept MasterCard and VISA. Distributed in Canada by Kelly Software

BY THOMAS REVITTE

# WACKO



Photo—Suzanne Torsheya

Why struggle with math concepts when a little competition makes learning fun and easy?

Wacko is a math game for two players or teams. The object of the game is to arrange a group of numbers in order from smallest to largest (bottom to top).

The whole-numbers game uses numbers 1–30, and the fractions game uses 27 fractions. It uses 1/9 as the smallest fraction and 8/9 as the largest, while using denominators 2, 3, 4, 5, 6, 7, 8, and 9; all fractions used are already reduced to their lowest terms. Each fraction used is unique, so no two have the same value. The first player (or team) to get the numbers in order wins.

## Loading

If you use a 16K with Extended Basic, you must type PCLEAR1 and press enter after you turn on the computer and before you enter Wacko.

*System Requirements*

**16K RAM**
**Color Basic**
**Two Joysticks**

A new way to play the numbers game! Wacko will teach math concepts and show you a good time.

## Playing the Game

After the musical introduction, press any key, and the screen asks you to choose whole numbers, fractions, or whether you want to quit playing.

Each player then types in his name (up to nine letters) and presses enter. Player 1 uses the left joystick and left side of the gameboard; player 2 plays the right joystick and right side. Press any key to start the game.

When the gameboard appears, each player or team starts the game with seven numbers in boxes, arranged from top to bottom on his side of the gameboard. At the top center of the gameboard are two boxes, one with a P under it and one with a D under it. Just to the right of each of player 1's number boxes is an exchange box. All of player 1's exchange boxes are empty except the bottom one, which has a number in it.

Keeping in mind the goal of arranging his numbers in order, player 1 uses his joystick to move the number in the exchange box up and down to the other boxes, until it is in the exchange box next to the number that he wants to exchange.

When player 1 has the exchange number in the box he wants, he pushes the button on his joystick. The number in the box goes to the left box at the top center of the gameboard. The D under the box stands for discard. The number in the exchange box goes to the number box, emptying the exchange box. You hear a tone and player 1's name disappears from above his boxes, and player 2's name appears above his.

Player 2 presses either D or P causing exchange boxes to appear to the left of his number boxes. One of the exchange boxes has a number. If he pressed D, the number in the exchange box is the number from the D (discard) box.

If he pressed P, the number in the exchange box is a number between 1 and 30, not already on the gameboard. P stands for pile and includes all the numbers between 1 and 30 not on the gameboard and not discarded. After you have used all the numbers in the pile, the discarded numbers (except for the most recent discard) become the new pile. The numbers in the pile are never visible.

For this example, assume that player 2 presses P and that the number 5 goes from the pile to an exchange box.

Player 2 moves the exchange number (the number 5) up or down until it is next to a number box for exchange. Player 2 places the exchange number next to the number box with the number 8 in it and pushes the joystick button. The number 8 from the number box goes to the discard box, the number 5 from the exchange box goes to the number box, a tone sounds, and player 2's name disappears from above his boxes.

Player 1 presses either D or P and a number appears in one of his exchange boxes, either the number from the discard box (8 in our example) or the next number from the pile, depending on whether he pressed D or P.

The game continues this way until one of the players (or teams) has all the numbers in his boxes in order from smallest to largest, bottom to top.

### Whole-Numbers Game

The whole-numbers game is fun for players of all ages and is intended as a learning tool for students in kindergarten through grade 4. It teaches the number relationships for the whole numbers 1–30.

### Fractions Game

The fractions game is fun for anyone who understands fractions, and it is a learning tool for students in grades 5–9, teaching the fractions relationships for the single-digit denominator fractions from 1/9 to 8/9.

### General Strategy

In addition to arranging your own numbers, keep in mind your opponent's progress. For example, if you want to make an exchange, but the discard would give your opponent a win, it would be best to make a different exchange.

### Fractions Strategy

Although you can use many strategies, try to either mentally or on paper translate each fraction to a percent, by dividing the numerator by the denominator and multiplying the answer by 100. This strategy is successful, and a learning aid.

### Team Play

You can play both the whole-numbers and fractions games in teams with members deciding what exchange to make. Team play gives the chance for group learning.

Whichever way you play Wacko, it provides learning help for math concepts, and makes an enjoyable game. ■

---

*Address correspondence to Thomas Revitte, 808 Nottingham, Sturgis, MI 49091.*

*Program Listing. Wacko*

```
10 CLS(0) : W$="WINS"
20 DIMA$(30),AB(30),A(30),F$(27)
,F(27),ZA(56),N(30),PE(27)
30 FORX=1TO56:READZA(X):NEXTX
40 DATA 1216,1225,1250,1252,1255
,1267,1272,1276,1281,1283,1290,1
229,1296,1238,1241,1308,1244,130
2,1305,1184,1192,1203,1206,1209,
1210,1211,1220,1235,1240,1299,13
06,1307,1189
50 DATA 1193,1198,1199,1200,1217
,1294,1295,1237,1256,1257,1269,1
232,1293,1221,1224,1249,1251,125
8,1261,1282,1284,1287,1268
60 Y=15 : A$(1)=" 1" : A$(2)=" 2
" : A$(3)=" 3" : A$(4)=" 4" : A$
(5)=" 5" : A$(6)=" 6" : A$(7)="
7" : A$(8)=" 8" : A$(9)=" 9"
70 FORX=10TO30:B$=STR$(X) : A$(X
)=RIGHT$(B$,2) : NEXTX
80 FORX=1TO16:READAB(X):NEXTX
90 DATA 1090,1154,1218,1282,1346
,1410,1474,1115,1179,1243,1307,1
371,1435,1499,1036,1040
100 FORX=1TO27 : READF$(X) : PE(
X) = VAL(LEFT$(F$(X),1)) / VAL(R
IGHT$(F$(X),1)) : NEXTX
110 DATA 19,18,17,16,15,29,14,27
,13,38,25,37,49,12,59,47,35,58,2
3,57,34,79,45,56,67,78,89
120 ZB=6
130 CLS(0)
140 FORX=1TO11 : POKEZA(X),133+(
ZB*16) : NEXTX
150 FORX=12TO13 : POKEZA(X),134+
(ZB*16) : NEXTX
160 FORX=14TO16 : POKEZA(X),136+
(ZB*16) : NEXTX
170 FORX=17TO19 : POKEZA(X),137+
(ZB*16) : NEXTX
180 FORX=20TO32 : POKEZA(X),129+
(ZB*16) : NEXTX
190 FORX=33TO40 : POKEZA(X),130+
(ZB*16) : NEXTX
200 FORX=41TO44 : POKEZA(X),131+
(ZB*16) : NEXTX
210 FORX=45TO46 : POKEZA(X),132+
(ZB*16) : NEXTX
220 FORX=47TO55 : POKEZA(X),138+
(ZB*16) : NEXTX
230 POKEZA(56),140+(ZB*16)
240 FORX=1TO3
250 SOUND96,1:SOUND192,1:SOUND99
,1:SOUND191,1:SOUND235,1:SOUND81
,1:SOUND66,1:SOUND177,1:SOUND88,
1:SOUND77,1:SOUND166,1:SOUND99,1
:SOUND222,1:SOUND244,1:SOUND33,1
:SOUND11,1:SOUND122,1:SOUND28,1:
SOUND218,1:SOUND18,1:SOUND38,1
260 NEXTX
270 CLS(3) : PRINT@96,"'WACKO!!'
 IS A GAME FOR 2       PLAYERS.
EACH PLAYER TRIES TO   PUT THE N
UMBERS IN HIS/HER      COLUMN IN
 ORDER FROM GREATEST   TO LEAST,
 GREATEST ON TOP.      WHOLE NUM
BERS USED ARE 1-30.    THE FRACT
IONS GAME NUMBERS ARE"
280 PRINT"FROM 1/9 TO 8/9 , INCL
UDING     DENOMINATORS OF 2,3,4,
5,6,7,8,9;ALL FRACTIONS USED ARE
```

*Listing continued*

*Listing continued*

```
 ALREADY  REDUCED TO THEIR LOWES
T TERMS."
290 PRINT"   PRESS SPACEBAR OR A
NY KEY TO GO ON."
300 CH$=INKEY$: IF CH$=""THEN300
310 CLS(4) : PRINT@160,"PRESS TH
E NUMBER IN FRONT OF    THE GAME
 YOU WANT."
320 PRINT"1 - WHOLE NUMBERS
          2 - FRACTIONS"
330 PRINT"3 - QUIT PLAYING"
340 Y=15
350 SOUND89,2:SOUND133,2:FORTD=1
TO60:NEXTTD:SOUND89,2:SOUND133,2
:FORTD=1TO60:NEXTTD:SOUND89,2:SO
UND133,2:FORTD=1TO60:NEXTTD:SOUN
D89,2:SOUND133,2:SOUND147,2:SOUN
D133,2:SOUND125,2:FORTD=1TO60:NE
XTTD:SOUND133,2:SOUND147,2:FORTD
=1TO60:NEXTTD
360 SOUND89,2:SOUND125,2:FORTD=1
TO60:NEXTTD:SOUND89,2:SOUND125,2
:FORTD=1TO60:NEXTTD:SOUND89,2:SO
UND125,2:FORTD=1TO60:NEXTTD:SOUN
D89,2:SOUND125,2:SOUND133,2:SOUN
D125,2:SOUND108,2:FORTD=1TO60:NE
XTTD:SOUND125,2:SOUND133,2
370 CH$=INKEY$:IFCH$=""THEN370
380 IFCH$ <> "1" AND CH$ <> "2"
AND CH$ <> "3" THEN370
390 G=VAL(CH$)
400 IF G = 3 THENCLS(2) : END
410 CLS(2) : PRINT@128,"TYPE IN
YOUR FIRST NAME AND     PRESS EN
TER. PLAYER 1 PLAYS THE LEFT JOY
STICK; PLAYER 2 PLAYS   THE RIGH
T JOYSTICK."
420 PRINT"PLAYER 1: "; : LP$=""
 : H = 0
430 H$ = INKEY$ : IF H$=""THEN43
0
440 PRINTH$; : LP$ = LP$ + H$ :
H=H+1
450 IFH$=CHR$(8) OR H$ =CHR$(21)
THENLP$=LEFT$(LP$,LEN(LP$)-2):H=
H-2
460 IFH > 9 OR H$=CHR$(13)THEN47
0ELSE430
470 IFRIGHT$(LP$,1)=CHR$(13)THEN
 LP$=LEFT$(LP$,LEN(LP$)-1)
480 PRINT:PRINT"PLAYER 2: "; : R
P$="" : H = 0
490 H$=INKEY$ : IF H$="" THEN490
500 PRINTH$; : RP$ = RP$ + H$ :
H= H + 1
510 IFH$=CHR$(8) OR H$=CHR$(21)T
HENRP$=LEFT$(RP$,LEN(RP$)-2):H=H
-2
520 IFH > 9 OR H$=CHR$(13)THEN53
0ELSE490
530 IFRIGHT$(RP$,1)=CHR$(13)THEN
RP$=LEFT$(RP$,LEN(RP$)-1)
540 IFG <> 2 THEN600
550 L=27
560 FORX=1TO27:N(X) = X : NEXTX
570 FORX=1TO27
580 R=RND(L) : F(X) = N(R) : N(R
) = N(L) : L= L-1 : NEXTX
590 GOTO640
600 L=30
610 FORX=1TO30:N(X)=X : NEXTX
620 FORX=1TO30
630 R=RND(L): A(X) = N(R) : N(R)
 = N(L) : L= L-1 : NEXTX
640 CLS(5) : PRINT@224,"PRESS TH
E SPACEBAR OR ANY KEY   TO BEGIN
 THE GAME."
650 CH$=INKEY$:IFCH$=""THEN650
660 IF G = 2 THENCLS(7) ELSECLS(
6)
670 FORX=1TO16
680 IF G = 2 THENPOKEAB(X)-1,128
 : POKEAB(X),128 : POKEAB(X)+1,1
28 : GOTO700
690 POKEAB(X),128:POKEAB(X)+1,12
8
700 NEXT X
710 FORX=1TO14
720 IF G = 2 THENPOKEAB(X)-1, AS
C(LEFT$(F$(F(X)),1)) : POKEAB(X)
,47 : POKEAB(X)+1, ASC(RIGHT$(F$
(F(X)),1)) : GOTO740
730 POKEAB(X), ASC(LEFT$(A$(A(X)
),1)) : POKEAB(X)+1, ASC(RIGHT$(
A$(A(X)),1))
740 NEXTX
750 POKEAB(15)+33,68 : POKEAB(16
)+33,80
760 FORX=1TOLEN(LP$) : POKE1024+
X,239 : POKE1024+X, ASC(MID$(LP$
,X,1)) : NEXTX
770 IF G = 2 THENPOKEAB(7)+3, AS
C(LEFT$(F$(F(Y)),1)) : POKEAB(7)
+4,47 : POKEAB(7)+5, ASC(RIGHT$(
F$(F(Y)),1)) : GOTO790
780 POKEAB(7)+3,ASC(LEFT$(A$(A(Y
)),1)) : POKEAB(7)+4,ASC(RIGHT$(
A$(A(Y)),1))
790 J=JOYSTK(0)
800 JL=JOYSTK(3)
810 JL=INT(JL/10)+1
820 FORX=1TO7
830 IF G = 2 THENIF JL = X THEN
850 ELSE POKEAB(X)+3,159 : POKEA
B(X)+4,159 : POKEAB(X)+5,159 : G
OTO850
840 IFJL = X THEN850 ELSE POKEAB
(X)+3,239 : POKEAB(X)+4,239
850 NEXTX
860 IF G = 2 THENPOKEAB(JL)+3, A
SC(LEFT$(F$(F(Y)),1)) : POKEAB(J
L)+4,47 : POKEAB(JL)+5, ASC(RIGH
T$(F$(F(Y)),1)) : GOTO880
870 POKEAB(JL)+3,ASC(LEFT$(A$(A(
Y)),1)): POKEAB(JL)+4, ASC(RIGHT
$(A$(A(Y)),1))
880 IFPEEK(65280)=125 OR PEEK(65
280)=253 THEN890ELSE790
```

*Listing continued*

# I'll teach you a lesson...

Twenty-four half-hour lessons, in fact.

I'm Dennis Kitsz, weary but cheerful after days in Green Mountain Micro's recording studio. What I've just finished are twelve hours of lessons for "Learning the 6809", a guide to assembly language programming like there's never been before. With the Micro Language Lab, you get it all — not only the theory of 6809 assembly language programming, but what you need to know to make your Color Computer really sweat for you.

And you'll get me on tape doing what I do best: talking, explaining 6809 assembly language and showing you how to tame it. You'll also get dozens of example programs right on the tapes, ready to load, examine and run. Even the accompanying book of documentation could each you assembly language, but "Learning the 6809" doesn't stop there. Micro Language Lab gives you what you can't get anywhere else: programming information for every one of your Color Computer's "smart" circuits.

'Learning the 6809" isn't that same old isn't-it-wonderful-you-can-put-the-dot-on-the-screen approach. My Micro Language Lab will each you numbers, graphics, and sound, but it won't run away from you after the first lesson. I want you to learn to program. To learn to use those numbers, graphics, and sound. To find ways of using every electronic nook and cranny in your machine. And I want you to stop wasting memory and make your program run in seconds, not minutes. I won't lose you, because each lesson is carefully paced, and the book contains exercises and self-tests.

put jargon in its place, too. If you've ever been intimidated by genius programmers, you'll know what I mean. You'll be able to drop a few accumulators, registers, and zero-indexed offsets into your conversation, too.

So contact me or RB2-3 at Green Mountain Micro. "Micro Language Lab" comes in a notebook containing twelve cassettes, documentation, workbook, and data booklets. It costs $99, plus $3.50 shipping and handling. Z80 and 6502 Labs will be available shortly.

And don't forget that Green Mountain Micro is your haven for Color Computer support. We've got hardware and software for the holidays, technical assistance, memory upgrades and spare parts.

*What is the ultimate all-software music synthesizer for your TRS-80 Color Computer?*
*What is the least expensive all-software music synthesizer for your Color Computer?*
*Quaver, the most realistic music experience you'll ever hear from your Color Computer!*

## COLOR QUAVER

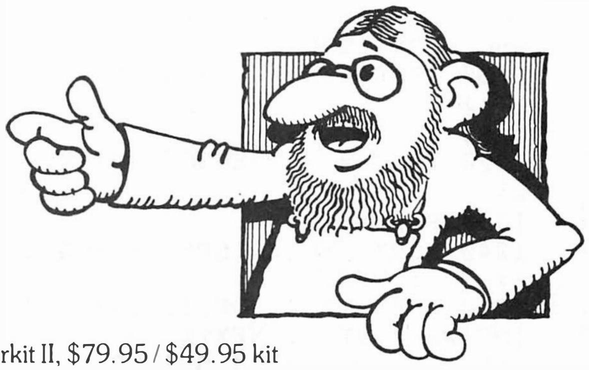
**Software Music Synthesizer**

(New Version 2.1 for 32K ECB)

**by Dennis Bathory Kitsz** author of "Custom Color"

- Real Music Synthesis — More Than Bleeps!
- Full 4-Part Harmony — In Precise Tuning.
- Versatile Editor/Compiler/Storage System.
- Entirely Software — No Hardware Needed.
- Variable Tone Qualities for Each Part.
- 64-Step Variable Envelope for Each Part
- FAST Compiler — Finished Music in 5 Seconds!
- Ready-to-Play Sample Tunes Included.

— Special Holiday Price —
Only $19.95 on tape
(Add $2.50 shipping and handling)
(Not sure? Audition Our Sample Music Tape — $4.00 postpaid)
For 32/64K TRS-80 Color Computers with Extended Color Basic.



- Lowerkit II, $79.95 / $49.95 kit
- 64K Color memory upgrade kit, $49.95
- MC-10 added 4K upgrade kit, $19.95
- CoCoPort interface, $49.95 / $39.95 kit
- RAM/ROM pack, $29.95 / $19.95 kit
- Color Burner, $69.95/$49.95 kit (available January 1st)
- Scroll-A-Roll software video text display, $24.95
- TV Buff II, improved to handle virtually all monitors, $14.95

(Add $2.50 shipping and handling, additional $2.00 for Canadian orders)

# Green Mountain Micro

✓98

Bathory Road • Roxbury, Vermont 05669
(802) 485-6112

***Continuing support for Color Computer Model I/III and 100***

COD/VISA/MASTERCARD

Dealer Inquiries Invited.

TRS-80 is a trademark of Tandy Corporation

*Listing continued*

```
890 IF G <> 2 THEN960ELSESOUND12
8,5:POKEAB(JL)-1,128 : POKEAB(JL
),128 : POKEAB(JL)+1,128 : POKEA
B(15)-1, ASC(LEFT$(F$(F(JL)),1))
 : POKEAB(15),47 : POKEAB(15)+1,
 ASC(RIGHT$(F$(F(JL)),1)) : POKE
AB(JL)+3,159 : POKEAB(JL)+4,159
: POKEAB(JL)+5,159
900 POKEAB(JL)-1, ASC(LEFT$(F$(F
(Y)),1)) : POKEAB(JL),47 : POKEA
B(JL)+1, ASC(RIGHT$(F$(F(Y)),1))
910 T$=F$(F(JL)) : F$(F(JL)) = F
$(F(Y)) : F$(F(Y)) = T$ : T=PE(F
(JL)) : PE(F(JL)) = PE(F(Y)) : P
E(F(Y)) = T
920 FORX=1TO6
930 IFPE(F(X+1)) > PE(F(X)) THEN
1140
940 NEXTX
950 GOTO1020
960 SOUND128,5:POKEAB(JL),128 :
POKEAB(JL)+1,128 : POKEAB(15),AS
C(LEFT$(A$(A(JL)),1)) : POKEAB(1
5)+1, ASC(RIGHT$(A$(A(JL)),1)) :
 POKEAB(JL)+3,239 : POKEAB(JL)+4
,239
970 POKEAB(JL), ASC(LEFT$(A$(A(Y
)),1)) : POKEAB(JL)+1, ASC(RIGHT
$(A$(A(Y)),1))
980 T$=A$(A(JL)) : A$(A(JL))= A$
(A(Y)) : A$(A(Y))= T$
990 FORX=1TO6
1000 IFA$(A(X+1)) > A$(A(X))THEN
1140
1010 NEXTX
1020 IF G = 2 THENNC=239ELSENC=2
23
1030 FORY=1TO5
1040 FORX=1TOLEN(LP$) : POKE1024
+X,NC : NEXTX
1050 FORX=1TO4:POKE1030+X, ASC(M
ID$(W$,X,1)) : NEXTX
1060 FORTD=1TO150:NEXTTD
1070 FORX=1TO4:POKE1030+X,NC : N
EXTX
1080 FORX=1TOLEN(LP$):POKE1024+X
,239 : POKE1024+X,ASC(MID$(LP$,X
,1)) : NEXTX
1090 FORTD=1TO150:NEXTTD
1100 NEXTY
1110 SOUND89,2:SOUND125,2:SOUND1
33,2:SOUND147,8:SOUND89,2:SOUND1
25,2:SOUND133,2:SOUND147,8:SOUND
89,2:SOUND125,2:SOUND133,2:SOUND
147,4:SOUND125,4:SOUND89,4:SOUND
125,4:SOUND108,8
1120 SOUND125,2:SOUND125,2:SOUND
108,2:SOUND89,4:SOUND89,2:SOUND1
25,4:SOUND147,2:SOUND147,2:SOUND
133,8:SOUND125,2:SOUND133,2:SOUN
D147,4:SOUND125,4:SOUND89,4:SOUN
D108,4:SOUND89,8
1130 CLS(7):GOTO120
1140 IF G = 2 THENNC=239ELSENC=2
23
1150 FORX=1TOLEN(LP$):POKE1024 +
 X,NC : NEXTX
1160 FORX=1TOLEN(RP$) : POKE1043
+X,191 : POKE1043+X, ASC(MID$(RP
$,X,1)) : NEXTX
1170 CH$=INKEY$: IFCH$=""THEN117
0
1180 IFCH$ <> "D" ANDCH$ <> "P"T
HEN1170
1190 IFCH$="P"THENY=Y+1: IFG = 2
 AND Y > 27 THEN Y = 15 ELSE IF
Y > 30 THEN Y = 15
1200 IF G = 2 THENPOKEAB(14)-5,
ASC(LEFT$(F$(F(Y)),1)) : POKEAB(
14)-4,47 : POKEAB(14)-3, ASC(RIG
HT$(F$(F(Y)),1)) : GOTO1220
1210 POKEAB(14)-3, ASC(LEFT$(A$(
A(Y)),1)) : POKEAB(14)-2, ASC(RI
GHT$(A$(A(Y)),1))
1220 IFCH$="D"THEN IF G = 2 THEN
 POKEAB(15)-1,128 : POKEAB(15),1
28 : POKEAB(15)+1,128 ELSEPOKEAB
(15),128 : POKEAB(15)+1,128
1230 J=JOYSTK(0)
1240 JR=JOYSTK(1)
1250 JR=INT(JR/10)+8
1260 FORX=8TO14
1270 IF G = 2 THEN IF JR = X THE
N 1290 ELSE POKEAB(X)-5,255 : PO
KEAB(X)-4,255 : POKEAB(X)-3,255
: GOTO1290
1280 IF JR = X THEN 1290 ELSEPOK
EAB(X)-3, 191 : POKEAB(X)-2,191
1290 NEXTX
1300 IF G = 2 THEN POKEAB(JR)-5,
 ASC(LEFT$(F$(F(Y)),1)) : POKEAB
(JR)-4,47 : POKEAB(JR)-3, ASC(RI
GHT$(F$(F(Y)),1)) : GOTO1320
1310 POKEAB(JR)-3, ASC(LEFT$(A$(
A(Y)),1)) : POKEAB(JR)-2, ASC(RI
GHT$(A$(A(Y)),1))
1320 IFPEEK(65280)=126 OR PEEK(6
5280)=254 THEN1330ELSE1230
1330 IF G <> 2 THEN1400ELSESOUND
128,5: POKEAB(JR)-1,128 : POKEAB
(JR),128 : POKEAB(JR)+1,128 : PO
KEAB(15)-1, ASC(LEFT$(F$(F(JR)),
1)) : POKEAB(15),47 : POKEAB(15)
+1, ASC(RIGHT$(F$(F(JR)),1)) : P
OKEAB(JR)-5,255 : POKEAB(JR)-4,2
55 : POKEAB(JR)-3,255
1340 POKEAB(JR)-1, ASC(LEFT$(F$(
F(Y)),1)) : POKEAB(JR),47 : POKE
AB(JR)+1, ASC(RIGHT$(F$(F(Y)),1)
)
1350 T$=F$(F(JR)) : F$(F(JR)) =
F$(F(Y)) : F$(F(Y)) = T$ : T=PE(
F(JR)) : PE(F(JR)) = PE(F(Y)) :
PE(F(Y)) = T
1360 FORX=8TO13
1370 IFPE(F(X+1)) > PE(F(X)) THE
N1580
1380 NEXTX
```

*Listing continued*

*Listing continued*

```
1390 GOTO1460
1400 SOUND128,5:POKEAB(JR),128:
POKEAB(JR)+1,128 : POKEAB(15),AS
C(LEFT$(A$(A(JR)),1)) : POKEAB(1
5)+1, ASC(RIGHT$(A$(A(JR)),1)) :
 POKEAB(JR)-3,191 : POKEAB(JR)-2
,191
1410 POKEAB(JR), ASC(LEFT$(A$(A(
Y)),1)) : POKEAB(JR)+1, ASC(RIGH
T$(A$(A(Y)),1))
1420 T$=A$(A(JR)) : A$(A(JR))= A
$(A(Y)) : A$(A(Y)) = T$
1430 FORX=8TO13
1440 IFA$(A(X+1)) > A$(A(X)) THE
N1580
1450 NEXTX
1460 IF G = 2 THENNC=239ELSENC=2
23
1470 FORY=1TO5
1480 FORX=1TOLEN(RP$): POKE1043+
X,NC:NEXTX
1490 FORX=1TO4:POKE1049+X,239 :
POKE1049+X, ASC(MID$(W$,X,1)) :
NEXTX
1500 FORTD=1TO150:NEXTTD
1510 FORX=1TO4:POKE1049+X,NC:NEX
TX
1520 FORX=1TOLEN(RP$):POKE1043+X
,191: POKE1043+X, ASC(MID$(RP$,X
,1)): NEXTX
1530 FORTD=1TO150:NEXTTD
1540 NEXTY
1550 SOUND89,2:SOUND125,2:SOUND1
33,2:SOUND147,8:SOUND89,2:SOUND1
25,2:SOUND133,2:SOUND147,8:SOUND
89,2:SOUND125,2:SOUND133,2:SOUND
147,4:SOUND125,4:SOUND89,4:SOUND
125,4:SOUND108,8
1560 SOUND125,2:SOUND125,2:SOUND
108,2:SOUND89,4:SOUND89,2:SOUND1
25,4:SOUND147,2:SOUND147,2:SOUND
147,2:SOUND133,8:SOUND125,2:SOUN
D133,2:SOUND147,4:SOUND125,4:SOU
ND89,4:SOUND108,4:SOUND89,8
1570 CLS(7):GOTO120
1580 IF G = 2 THENNC=239ELSENC=2
23
1590 FORX=1TOLEN(RP$) : POKE1043
+X,NC : NEXTX
1600 FORX=1TOLEN(LP$):POKE1024+X
,239 : POKE1024+X, ASC(MID$(LP$,
X,1)) : NEXTX
1610 CH$=INKEY$ : IFCH$=""THEN16
10
1620 IFCH$ <> "D" AND CH$ <> "P"
 THEN1580
1630 IFCH$="P"THENY=Y+1 : IF G =
 2 AND Y > 27 THEN Y = 15 ELSE I
F Y > 27 THEN Y = 15
1640 IFCH$="D"THEN IF G = 2 THEN
POKEAB(15)-1,128 : POKEAB(15),12
8 : POKEAB(15)+1,128 ELSE POKEAB
(15),128 : POKEAB(15)+1,128
1650 GOTO770
```

*END*

SOFTMART MAY SALES

ALL ITEMS IN STOCK AND READY FOR IMMEDIATE SHIPPING

VIP WRITER (SOFTLAW) .... 52.95 C/D (32K (C) / 32K (D))
VIP SPELLER (SOFTLAW) .... 44.95 D
VIP CALC (SOFTLAW) .... 52.95 C/D (32K (C) / 32K (D))
VIP TERMINAL (SOFTLAW) .... 44.95 C/D (32K)
VIP DATABASE (SOFTLAW) .... 52.95 D (32K)
HAYWIRE (MARK DATA) .... 22.00 C .... 26.95 D (16K(C)/32K (D))
ZAKSUND (ELITE) .... 22.50 C .... 25.25 (32K)
HOME MONEY MANAGER (COMPUTERWARE) .... 17.95 C
.... 26.95 D (32K)
ASTRO BLAST (MARK DATA) 22.25 C .... 25.25 D(16K(C) / 32K (D))
DOT TO DOT (PROGRAMS BY MR. BOB) .... 13.95 (16 K EXT.)
RANDOM BASIC FOR CC FLEX (COMPUTERWARE) .... 50.00 D (64K)
CC FLEX (FRANK HOGG LAB) .... 59.95 D (64K)
ED/ASM (FRANK HOGG LAB) .... 61.95 D (64 K)
THE KING (TOM MIX) .... 23.50 C .... 26.25 D (32K)
COSMIC CLONES (MARK DATA) .... 22.00 C .... 26.95 D
.... (16 K (C) / 32K (D))
EIGHT-BIT BARTENDER (PRICKLY PEAR) .... 17.95 .... 22.45 (32K)
ELITE CALC (ELITE) .... 39.95 C/D (16K / 32K / 64K)
COLOR KIT (PRICKLY PEAR) .... 31.50 C .... 35.95 D (16K)
FLASH CARD (TCE) .... 13.95 C .... 17.95 D (16 K EXT.)
SEA DRAGON (ADVENTURE INT'L) .... 30.95 C (32 K)
CUBIX (SPECTRAL ASSOC.) .... 20.50 C (32K)
COLOR FURY (COMPUTER SHACK) .... 23.95 C .... 26.25 D (32K)
DISK MANAGER (PRICKLY PEAR) .... 26.95 D
64K DISK UTILITY (SPECTRUM PROJECTS) .... 19.75D (64K)
CHOPPER STRIKE (COMPUTER SHACK) .... 26.95 C (16K & 32K)
EARLY GAMES (COUNTERPOINT) .... 25.95 C/D (16K)

AND MUCH MORE!

Become a Preferred Customer of **SOFTMART** and Receive:

- Free Monthly Sales Sheet
- Descriptive Catalog with Over 2000 Programs for CoCo
- 48 Hour In Stock Shipping
- 30 Day Money Back Guarantee
- User's Group Purchasing Program
- Acceptance of Checks with No Delay in Mailing
- Open Door Policy on Additions to Our Product Line

PLACE AN ORDER FROM THIS AD OR SEND US YOUR NAME
AND ADDRESS AND WE WILL SEND YOUR
MAY SALES SHEET AND OUR
**FREE CATALOG**

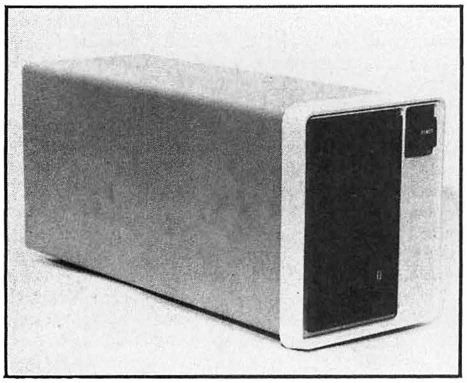
Mail Orders: Send Check or M.O. MC & VISA Accepted.
P&H $2.00 Ground $4.00 Air.
NC Res. Add 4% Sales Tax. COD Orders $2.00 Extra.

**SOFTMART** ✓537
5024 E. Departure Drive
Raleigh, NC 27604
(919) 876-6124

**DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES**

# PRICE BREAKTHROUGH

## Super Sale on New Disk Drives



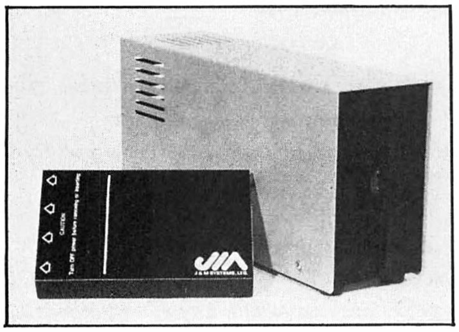
Introducing

## MEGADISK

5 to 20 Megabyte, ready to run on the TRS 80 Model I/III/IV/4P, color computer, I.B.M. PC, Apple, Franklin

**DRIVE A HARD BARGAIN™ Complete Systems Starting at $999.95**

## Call Toll Free Ordering 1-800-343-8841



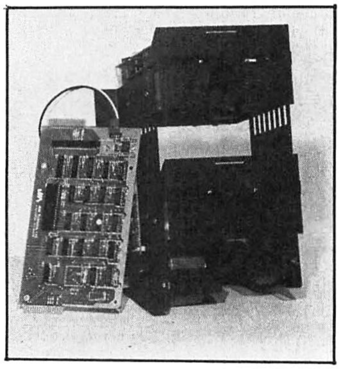
High Quality Lowest Price

**Drive 0, 1, 2, 3**

for the

**Color Computer**

**Starting at $199.95**



**Disk Drive Upgrade**

for model III/IV easy to install system

**Starting at ~~$369.95~~**

Call for new lower price

# SOFTWARE SUPPORT, INC.

One Edgell Road, Framingham, MA 01701 (617) 872-9090
Hours: Mon. thru Fri. 9:30 am to 5:30 (E.S.T.) Sat. 10 am to 4:30 pm

**DEALER INQUIRIES INVITED.**

TERMS:
M.C./Visa/Amex and personal checks accepted at no extra charge.
C.O.D., please add $3.00.
Shipping: Please call for amount.
Not responsible for typographical errors.

**CANADA**
**MICRO** R.G.S. INC.
751, CARRE VICTORIA, SUITE 403
MONTREAL, QUEBEC, CANADA, H2Y 2J3
Regular **Tel. (514) 845-1534**
**Canadian Toll Free 800-361-5155**

**Service! Service!**

*All in stock products are shipped within 24 hours of order. Repair/Warranty service is performed within 24 hours of receipt unless otherwise noted. We accept C.O.D., foreign and APO orders. School and D&B corporate P.O.s accepted.*

TRS/80 Registered Trademark Tandy Corp. IBM-PC Registered IBM Corp. Apple Registered Trademark Apple Computer Corp. Franklin Registered Trademark Franklin Corp. Max/80 Registered Trademark Lobo Int.

**DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES**

DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES

# PRICE BREAKTHROUGH

## Super Sale on New Disk Drives

Starting at $~~169.00~~! NEW LOW PRICE

**Tandon — Siemens — Remex — MPI — Teac — Shugart — Tabor**

40 or 80 Tracks — Single or Dual Head — New 3½" Drivette™
Our Disk Drives are Capable of Single **and** Dual Density Operation
The **NEWEST** Technology Capable of Operating on Most Popular Computers

**Drive a Hard Bargain!!™ For your TRS/80, Color Computer, IBM, Apple, Franklin**
**5 M.B.-20 M.B. Complete Systems......from $999.95**

**Diskette Breakthrough — 10 Pack in Library Case — $~~18.95~~** NEW LOW PRICE

**SAVE!! PLEASE CALL FOR OUR MOST CURRENT PRICE REDUCTIONS.**

**TOLL FREE ORDERING**
**1-800-343-8841**

**GENERAL AND TECHNICAL**
**1-617-872-9090**

| | |
|---|---|
| Disk Drives (0123) TRS/80-IBM-Apple-TI 99/4A-Franklin-Max/80-LNW | ◄ |
| Model I/III/IV Upgrade (Disk Drives-Memory) | ◄ |
| **Printers**—Daisywheel/Dot Matrix | ◄ |
| Percom Double Density Controller (Model I) | ◄ |
| Color Computer Printer Interfaces | ◄ |
| Disk Drive Operating Systems | ◄ |
| **Repair Services** Now Offered—FAST Turn-a-Round | ◄ |
| **Apple/Franklin Compatible Add-On Drives with Case & Cable** | ◄ |
| Diskettes in Library Cases | ◄ |
| **DISK DRIVE CASES AND POWER SUPPLIES** | starting at $59.95 |
| Printer **Buffers** 8K to 512K | starting at $143.95 |
| Holmes Model I/III speed-up Mod | starting at $90.00 |
| Cables—Printer/Disk Drive | starting at $23.00 |

**CALL TOLL FREE FOR NEW PRICES**

**Warranty on Disk Drives — 6 Months to 1 Year**

# SOFTWARE SUPPORT, INC.

One Edgell Road, Framingham, MA 01701 (617) 872-9090
Hours: Mon. thru Fri. 9:30 am to 5:30 (E.S.T.) Sat. 10 am to 4:30 pm

**DEALER INQUIRIES INVITED.**

TERMS:
M.C./Visa/Amex and personal checks accepted at no extra charge.
C.O.D., please add $3.00.
Shipping: Please call for amount.
Not responsible for typographical errors.

**CANADA**
**MICRO** R.G.S. INC.
751, CARRE VICTORIA, SUITE 403
MONTREAL, QUEBEC, CANADA, H2Y 2J3
Regular **Tel. (514) 845-1534**
**Canadian Toll Free 800-361-5155**

**Service! Service!**

*All in stock products are shipped within 24 hours of order. Repair/Warranty service is performed within 24 hours of receipt unless otherwise noted. We accept C.O.D., foreign and APO orders. School and D&B corporate P.O.s accepted.*

TRS/80 Registered Trademark Tandy Corp. IBM-PC Registered IBM Corp. Apple Registered Trademark Apple Computer Corp. Franklin Registered Trademark Franklin Corp. Max/80 Registered Trademark Lobo Int.

DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES

Save 44% off the newsstand price!
R
U
N

# THESE COULD BE THE KEYS TO YOUR FUTURE

PREMIERE ISSUE
RUN
The Commodore 64 & VIC-20 Magazine
Arcade Challenge—
Ordeal in the Canyons of Zelaz
Close Encounters with
C-64 Word Processing
VIC's Video Flash Cards
Fun Action Games:
Free—$20 VIC Disk Program

Unlock *all* the potential of your Commodore 64 and VIC-20* with **RUN**.

Explore . . . Experiment . . . Enjoy . . . Beginner and expert alike will be taken beyond the manual to the limits of their abilities. Enter your own game programs. Construct a simple hardware add-on. Broaden your scope with unique applications . . . And . . . get a 13th issue FREE!

Enjoy key features like these:

- Games for fun & strategy.
- Programming tips help you learn short cuts.
- Candid reviews help you make money-saving decisions.
- Programs to add to your library.
- Instructions & tutorials to increase your skills.
- Hardware & software modifications help your machine work smart.
- Unique applications broaden your scope.

Here's a system-specific magazine written with you in mind. Written by and for the reader to give time-saving, money-saving hints. You'll get instructions and tutorials to increase your skills, and candid reviews to help you make the right decisions. Most of all though, you'll have fun.

Commodore 64 and VIC-20 owners are one of the largest groups of computerists today. Enjoy the benefits of this with your own magazine. Be in control like never before. Order **RUN** today and get a 13th issue free with your prepaid order (check or credit card) of only $19.97. Send in the coupon or call toll free *1-800-258-5473*. In N.H. call *1-924-9471*.

*Send me a subscription to* ***RUN*** *for the regular subscription price of only $19.97 per year. I understand that with payment enclosed or credit card order I will receive a FREE issue making a total of 13 issues for $19.97.*

☐ *CHECK/MO* ☐ *MC* ☐ *AE* ☐ *VISA* ☐ *BILL ME*

card # ______________________ exp. date ________

signature ______________________

name ______________________

address ______________________

city ______________ state ______ zip ______

*Canada & Mexico $22.97; Foreign Surface $39.97, 1 year only, US funds drawn on US bank. Foreign airmail, please inquire. Please allow 6 to 8 weeks for delivery.*

**RUN • Box 954 • Farmingdale, NY 11737**

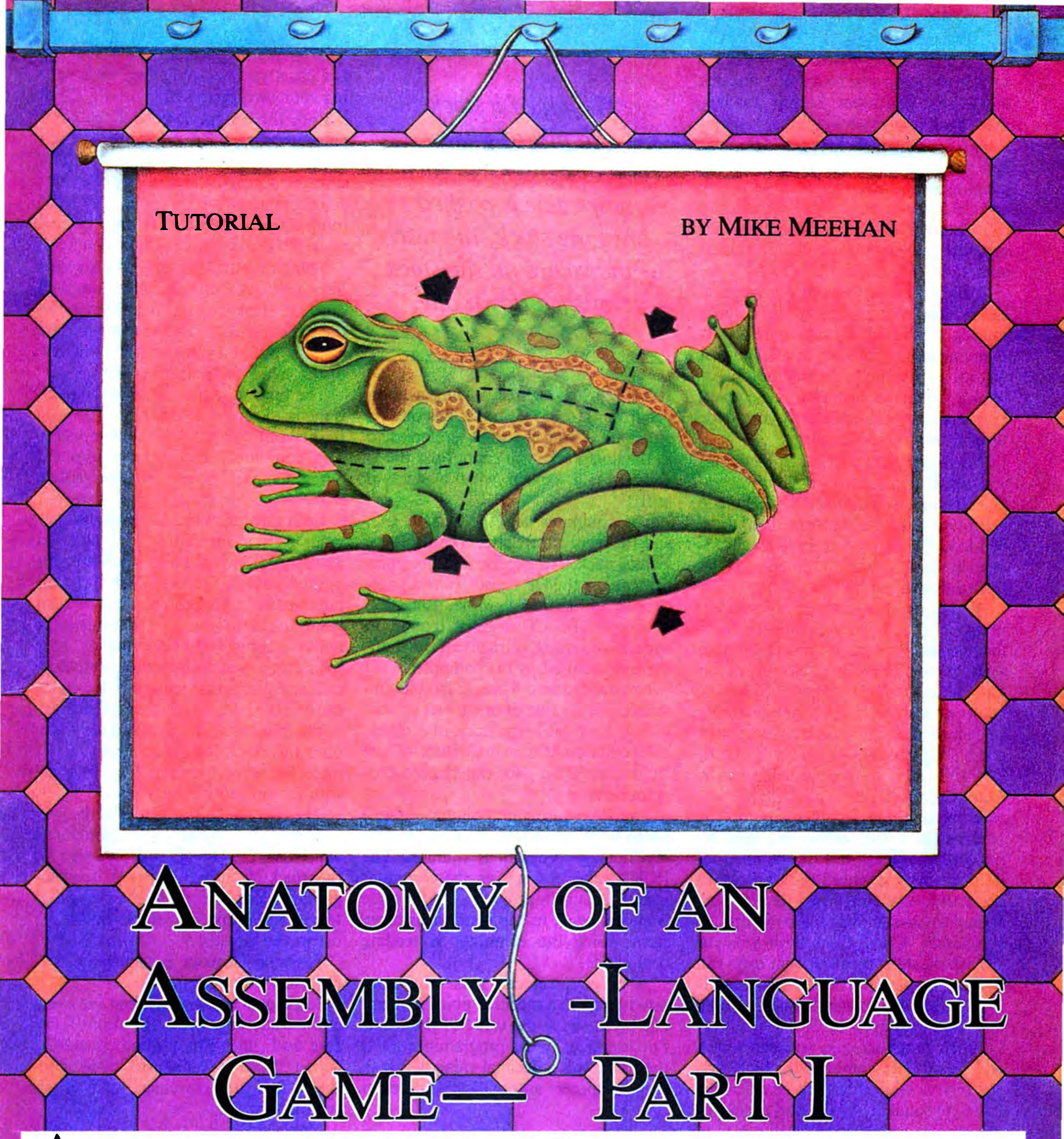
346F4

---

*Commodore 64 and VIC-20 are registered trademarks of Commodore Business Machines, Inc.*

TUTORIAL

BY MIKE MEEHAN



# ANATOMY OF AN ASSEMBLY-LANGUAGE GAME— PART I

Assembly-language programming doesn't have to be the big, ominous mystery most people make it. With the right instructions, anyone can learn to use this powerful language.

This is a six-part tutorial on writing Assembly-language programs. Each month I will present a new part of a game entitled Croaker, and at the end of the series, you can put the parts together to create the game. Croaker bears a resemblance to several of the Frogger-type games being sold commercially, and it is as good as or better than they are. (He's right—eds.)

End the ominous mystery of Assembly-language programming with this month-by-month CoCo tutorial.

*System Requirements*

**32K RAM**
**Extended Color Basic**
**Editor/Assembler**

The assembled version of Croaker runs on a 16K non-Extended Basic machine. To assemble the code, however, you need Extended Basic, an assembler, and possibly 32K, depending on the type of assembler you use. You cannot plug in your drive controller while you run any part of this program because the game uses some of the same memory. I'll publish a program to patch Croaker to disk at the end of the series.

If you use a disk-based assembler, assemble the programs to cassette and remove the controller before loading them back into memory.

There is a fine line between Assembly and machine language. Assembly language consists of codes such as LDA and STA, and you use an assembler to transform these codes into machine language, which the computer understands.

While it is easier to write a program in Basic, Basic is inefficient in its coding, causing a program to run more slowly than one in machine language. The best method is to write your program in Assembly language (using an assembler) and let the assembler convert your code directly to machine language.

When you use your assembler, you use several registers to write an Assembly-language program. All arithmetic functions must be performed in these registers. Think of a register as a variable in Basic where numbers can be loaded in and out.

While a number is in one of these registers, the computer can perform mathematical functions on it. Because there are so few registers, however, you must set aside a section of RAM before you write a program. Here you can store frequently used data, such as scores in a game. Registers A, B, D, X, Y, U, S, DP, CC, and PC are available in the Color Computer.

Some of these registers are for the programmer's use, others are used by the computer itself and can be manipulated by an experienced programmer to perform special functions. Registers A, B, and D have an unusual structure.

Registers A and B are both 8-bit (or 1-byte) registers, meaning that each can hold a number from 0–255. Register D is a 16-bit (2-byte) register that can hold any number from 0–65535.

When programming, you can use A and B, or D (a combination of A and B). If you load D with a hexadecimal (base 16) value of AABB and check the values of A and B, you find that A contains a hexadecimal value of AA, and B contains a hexadecimal value of BB.

Similarly, if you load A with a hexadecimal value of CD and B with a hexadecimal value of EF and check the value of D, you find that D contains a hexadecimal value of CDEF.

Because of this structure, you encounter problems if you use D and A or B and have them contain separate values. There are no limitations on registers X and Y since each is a 16-bit (2-byte) register and holds a number from 0–65535. Register U is also a 16-bit (2-byte) register holding a number from 0 to 65535, but it has one restriction. If you use what's referred to as the user stack, you cannot use the U register. (I'll explain what a stack is later.)

> *"Think of a stack as a pile of plates in a dispenser. As each new value is pushed onto the stack, the rest of the values on the stack are pushed down one."*

The computer uses the S, DP, CC, and PC registers. Register S controls the system stack. An experienced programmer can use the DP register (direct page) to call to addresses while using less memory. The CC register (condition codes) keeps track of many of the mundane values used by the computer.

It is divided into 8 bits. Each bit contains either a value of one (true) or zero (false). Each bit keeps track of a different condition. Changing values of the CC register is only for experienced programmers.

The PCR (program counter register) keeps track of what part of an Assembly-language program is running. The PCR's value changes as the computer moves through a program, but its value is always equal to the place in memory from which the computer is reading commands.

A programmer can make the computer jump to a specified point in memory by changing the value of the PCR. For example, if the programmer loads the PCR with a decimal value of 1,000, the computer automatically executes code at memory position 1000. Figure 1 is a chart you can reference while writing your own programs.

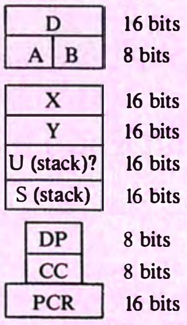


*Figure 1.*

Both the programmer and the computer use stacks to store subroutine addresses. Stacks provide temporary data storage using the two Assembly-language commands PSH (push) and PUL (pull). PSH pushes values onto a stack while PUL pulls values from a stack.

Think of a stack as a pile of plates in a dispenser. As each new value is pushed onto the stack, the rest of the values on the stack are pushed down one. As each value is pulled from the stack, the rest of the values are pulled up one.

The first value pushed onto the stack is the last value pulled, and the last value pushed onto the stack is the first pulled. The computer automatically uses the S register as a pointer for the system stack.

Each time an Assembly-language program calls a subroutine, the point in memory following the subroutine call is pushed onto the stack. When the computer receives the command to return from the subroutine, it automatically pulls the last value to be pushed onto the stack (the point after the subroutine call) and places that value into the PCR, causing the computer to jump back.

The programmer can also push values onto this stack for his own use, but he must be very careful not to interfere with the subroutine values.

The user stack is available to the programmer and unused by the computer, which uses the U register as a pointer for this stack. In using this stack, the programmer loses the use of the U register. If he does not use this stack, he has full use of the U register.

Assembly-language programs are written using four columns.

Listings in magazines often have several hexadecimal (base 16) numbers before each line. These numbers are the actual machine-language code produced by the assembler when it assembled the line.

You don't use these when writing your own programs and you should skip them when copying programs from magazines into an assembler. Some assemblers, such as Radio Shack's EDTASM+, use line numbers while others, such as The Micro Works' SDS80C, don't use them. Line numbers are used mostly in editing.

Your assembler manual will explain use of line numbers and how to move between the four columns. (See Table 1 for a list of editor/assemblers.) The four columns you use in an assembler are as follows:

# Macrotron**
# Proudly Introduces Our New *"Premium" Keyboard*— The Best For Your Color Computer

*"Have Josie ship yours today!"*

### The Best Keyboard

All the features of our popular PROFESSIONAL KEYBOARD:
No gluing, soldering, or cutting—plugs right in.
High quality construction assures years of trouble-free operation.

**PLUS**

Attractive low profile
Extended Radio Shack layout
Silk-Smooth feel

### The Best Software

Our Versakey Software enhances the keyboard's utility:

- * Auto-repeat, n-key rollover and type-ahead
- * F-1 becomes DEFINE, F-4 becomes CTRL
- * May define up to 128 keys (including SHIFT, CTRL, and SHIFT-CTRL combinations) as strings of up to 80 characters each.
- * Supplied on cassette, may be copied to disk.

### The Best Manual

- * Very complete documentation (including plenty of figures to illustrate the keyboard's installation and versatility).

### The Best Prices

| | |
|---|---|
| The "Premium" Keyboard (including software) | $79.95 |
| The "Professional" Keyboard (including software) | $59.95 |
| The "Versakey Software" | $ 9.95 |

Please specify your computer's PC board type if known. Otherwise, specify the complete catalog number and serial number.

**Micronix Systems is a subdivision of Macrotron Systems Corporation.

**MACROTRON SYSTEMS CORP.** 203
**8147 Delmar Blvd.**
**St. Louis, MO 63130**
**(314) 721-3356**
**Telex 704523 Answer Back-MACANITA STL UD**

Terms: Prepaid check or money order, Mastercard or Visa.
Shipping Charges: U.S. $3.00, Canada $6.00, COD $5.00 (No COD's to Canada).

```
10 '****************************
20 '***********CROAKER*********
30 '******BY: MIKE MEEHAN******
40 '*******COPYRIGHT 1983******
50 '**COLOR HORIZONS SOFTWARE**
60 '****************************
70 '**********PART ONE*********
80 '****************************
90 IF PEEK(49152)<>126ORPEEK(491
53)<>126THENCLS:PRINT"THE DISK D
RIVE CONTROLLER IS    PLUGGED IN
. TURN OFF THE        COMPUTER,
REMOVE THE CONTROLLER,AND RELOAD
 THIS PROGRAM FROM    CASSETTE."
:END
100 PMODE3:PCLS:SCREEN1,1:OF=5
110 COLOR 3,3:LINE(0,111)-(256,8
4),PSET:LINE(0,180)-(256,153),PS
ET:LINE(22,140)-(54,136),PSET:LI
NE(86,132)-(118,128),PSET:LINE(1
50,124)-(182,120),PSET:LINE(214,
116)-(246,112),PSET:PAINT(256,85
),4,3:PAINT(256,154),2,3
120 COLOR3,3:LINE(18,10)-(20,21)
,PSET,BF:LINE(20,9)-(28,11),PSET
,BF:LINE(20,20)-(28,22),PSET,BF
130 LINE(32,9)-(34,22),PSET,BF:L
INE(36,9)-(40,10),PSET,BF:LINE(4
0,9)-(40,14),PSET:LINE(32,14)-(4
0,14),PSET:LINE(32,15)-(38,15),P
SET:LINE(32,16)-(36,16),PSET:LIN
E(32,17)-(38,17),PSET:LINE(38,19
)-(40,22),PSET,BF:PSET(38,18,3)
140 LINE(44,10)-(46,21),PSET,BF:
LINE(52,10)-(54,21),PSET,BF:LINE
(46,9)-(52,12),PSET,BF:LINE(46,1
9)-(52,22),PSET,BF
150 LINE(58,12)-(60,22),PSET,BF:
LINE(66,12)-(68,22),PSET,BF:LINE
(60,11)-(66,11),PSET:LINE(62,9)-
(64,10),PSET,BF:LINE(60,17)-(64,
18),PSET,BF
160 LINE(72,9)-(74,22),PSET,BF:L
INE(76,13)-(80,9),PSET:LINE(76,1
4)-(82,9),PSET:LINE(76,16)-(82,2
2),PSET:LINE(76,17)-(80,22),PSET
170 LINE(86,9)-(88,22),PSET,BF:L
INE(86,9)-(94,11),PSET,BF:LINE(8
8,14)-(92,17),PSET,BF:LINE(88,20
)-(94,22),PSET,BF
180 LINE(98,9)-(100,22),PSET,BF:
LINE(102,9)-(106,10),PSET,BF:LIN
E(106,9)-(106,14),PSET:LINE(98,1
4)-(106,14),PSET:LINE(98,15)-(10
4,15),PSET:LINE(98,16)-(102,16),
PSET:LINE(98,17)-(104,17),PSET:L
INE(104,19)-(106,22),PSET,BF:PSE
T(104,18,3)
190 LINE(18,29)-(18,40),PSET:LIN
E(18,40)-(22,40),PSET:LINE(22,40
)-(22,35),PSET:LINE(22,35)-(18,3
5),PSET:LINE(26,35)-(26,40),PSET
:LINE(30,35)-(30,46),PSET:LINE(2
6,40)-(30,40),PSET:PSET(34,36,3)
:PSET(34,37,3):PSET(34,39,3):PSE
T(34,40,3)
200 LINE(38,29)-(38,40),PSET:LIN
E(46,29)-(46,40),PSET:LINE(40,31
)-(40,32),PSET:LINE(44,31)-(44,3
2),PSET:LINE(42,33)-(42,34),PSET
:LINE(50,34)-(50,40),PSET:LINE(5
0,31)-(50,32),PSET:LINE(54,29)-(
54,40),PSET:LINE(56,37)-(56,38),
PSET:LINE(58,35)-(58,36),PSET
210 LINE(58,39)-(58,40),PSET:LIN
E(62,36)-(62,40),PSET:LINE(62,40
)-(66,40),PSET:PSET(66,39,3):LIN
E(62,37)-(66,37),PSET:PSET(66,36
,3):PSET(64,35,3):LINE(70+OF,29)
-(70+OF,40),PSET
220 LINE(78+OF,29)-(78+OF,40),PS
ET:LINE(72+OF,31)-(72+OF,32),PSE
T:LINE(76+OF,31)-(76+OF,32),PSET
:LINE(74+OF,33)-(74+OF,34),PSET:
LINE(82+OF,36)-(82+OF,40),PSET:L
INE(82+OF,40)-(86+OF,40),PSET:LI
NE(82+OF,37)-(86+OF,37),PSET:PSE
T(86+OF,39,3)
230 PSET(86+OF,36,3):PSET(84+OF,
35,3):LINE(90+OF,36)-(90+OF,40),
PSET:LINE(90+OF,40)-(94+OF,40),P
SET:LINE(90+OF,37)-(94+OF,37),PS
ET:PSET(94+OF,39,3):PSET(94+OF,3
6,3):PSET(92+OF,35,3)
240 LINE(98+OF,29)-(98+OF,40),PS
ET:LINE(98+OF,35)-(102+OF,35),PS
ET:LINE(102+OF,35)-(102+OF,40),P
SET
250 LINE(106+OF,40)-(110+OF,40),
PSET:LINE(106+OF,38)-(110+OF,38)
,PSET:LINE(106+OF,38)-(106+OF,40
),PSET:LINE(110+OF,36)-(110+OF,4
0),PSET:LINE(108+OF,36)-(110+OF,
36),PSET:LINE(106+OF,35)-(108+OF
,35),PSET
260 LINE(114+OF,35)-(114+OF,40),
PSET:LINE(118+OF,36)-(118+OF,40)
,PSET:LINE(114+OF,36)-(118+OF,36
),PSET
270 PSET(20,51,3):PSET(20,58,3):
LINE(18,52)-(18,57),PSET:LINE(22
,53)-(22,56),PSET:PSET(24,53,3):
PSET(24,56,3):PSET(28,51,3):PSET
(28,58,3):LINE(30,52)-(30,57),PS
ET
280 LINE(36,50)-(36,58),PSET:LIN
E(44,50)-(44,58),PSET:LINE(40,50
)-(40,54),PSET:PSET(42,50,3):PSE
T(42,54,3):LINE(48,50)-(48,58),P
SET:LINE(52,50)-(52,58),PSET:PSE
T(50,50,3):PSET(50,54,3):PSET(50
,58,3)
290 LINE(60,50)-(60,58),PSET:LIN
E(56,50)-(60,50),PSET:LINE(56,58
)-(60,58),PSET:PSET(58,54,3)
300 CIRCLE(28,108),8,2,.5:PAINT(
28,108),2,2:LINE(26,94)-(30,108)
,PSET,BF
310 LINE(16,68)-(42,94),PSET,B
320 DRAW"BM30,75;C2;D1L2D2L4D1L2
D5R2D4R6U1L4U2R2U2R2U1R2D1R6U1L4
U3R2U2L2U1L2":PAINT(30,77),2,2:C
OLOR4,4:LINE(18,69)-(40,93),PSET
:LINE(18,93)-(40,69),PSET
330 DRAW"C2":GOSUB410:PAINT(166,
127),2,2:PAINT(172,121),2,2:PAIN
T(128,108),2,2:DRAW"C3":GOSUB410
:DRAW"C2":LINE(144,65)-(146,67),
PSET,BF
340 DRAW"BM134,137;C3;L8U1L2U1L2
U1L2U1L12"
350 DRAW"BM152,77;L4D2L10U1L2"
360 DRAW"C2":LINE(224,46)-(224,1
00),PSET:LINE(236,52)-(236,106),
PSET:LINE(224,46)-(236,52),PSET:
LINE(224,100)-(236,106),PSET:LIN
E(224,46)-(256,46),PSET:LINE(236
,106)-(256,106),PSET:PAINT(226,5
0),3,2:PAINT(238,47),3,2:LINE(23
6,52)-(256,52),PSET
370 DRAW"BM238,107;C2;D3R2D2R2D2
R8U2R2U2R2U3;C1":PAINT(244,107),
2,2:LINE(244,107)-(248,109),PSET
,BF:DRAW"BM226,101;C2;D3R2D3R2D1
R6":PAINT(237,107),2,2
380 FOR X=1 TO 1000:NEXTX
390 CLS:PRINT"POSITION TAPE AND"
:PRINT"PRESS <RECORD> BUTTONS TO
":PRINT"SAVE SCREEN ON CASSETTE.
":PRINT:PRINT:INPUT"THEN PRESS <
ENTER>";A$
400 CSAVEM"PART1",1536,7679,1536
:SOUND200,2:CLS:INPUT"SAVE ANOTH
ER COPY";A$:IFLEFT$(A$,1)="Y"THE
N390ELSE END
410 DRAW"BM144,60;L6D1L2D1L4D1L4
D1L4D1L2D1L2D2L2D1L2D1L2D1L2D1L2
D2L2D2L2D1L2D1L2D1L2D2L2D1L2D1L2
D2L2D2L2D1L2D1L2D5L2D4L2D3L2D2L2
D5L2D2L2D4L2D2L2D2L2D3L2D4R2"
420 DRAW"D1R6D2R4D1R12D2L2D1L2D1
L2D4R2D1R4D1R4D1R4D1R26U1R2U1R2U
3R6U1R4U4L1U1L14U1L4U1L2U7R4U2R2
U1R2U1R2U1R2U1R2U2R2D1R2D2R2D1R4
D1R4D1R4D2R8D3R2D2R4D2R10"
430 DRAW"U2L8U1R12U1L12U1R14U2L2
U1L18U1L2U1L2U1L2U1L4U2L4U2L2U3L
2U2L2U1R4D2R2D1R4D2R2D1R14D2R4D2
R8U2R2U2L6U1R8U3L2U1L10U1L8U1L2U
1L4U1L4U3L2U2L2U5"
440 DRAW"R2U4R2U2R2U9R2U4R2U3R2U
8L2U1L2U1L12U2L2":DRAW"BM148,64;
L10D1L2D2R2D2R6U1R2U1R2U3":RETUR
N
```

*Program Listing. Croaker—Part I*

| Col. 1 | Col. 2 | Col. 3 | Col. 4 |
|---|---|---|---|
| Label | Op-code | Operand | Comment |

The following is a simple Assembly-language program to clear the screen to pink. It accomplishes the same thing as CLS(8) in Basic.

```
BGIN   LDX    #$400   Load X with bgn
                      scrn address
       LDA    #255    Load A with
                      pink block code
LOOP   STA    ,X+     Store A at X,
                      increment x
       CMPX   #1536   X=1536?
       BNE    LOOP    No, then rpt loop
       RTS            Return to Basic
       END    BGIN    Stop assembling
```

The labels BGIN and LOOP in this program are used much like line numbers in Basic. The Basic command GOTO 10 might be JMP LOOP in Assembly language, with JMP as the op-code for Jump. You only need labels when the portion of code they define will be called up again. The labels are always placed in the first column.

The second column is used for the op-code, which tells the computer what command is going to be executed. Table 2 gives the full set of op-codes available for the Color Computer.

An L in front of a branch command tells the assembler to use a long branch. A short branch has a range of plus or minus 127 bytes, while a long branch can branch anywhere in memory. The long branch command for BRA would be LBRA. It is better to use a short branch since it uses less memory.

You have the full instruction set for the 6809 microprocessor (used by the Color Computer) but Croaker uses only a subset of these. Croaker's commands are easier to understand and now might be a good time to go back to the small program I gave earlier and look up the op-codes it takes.

The assembler uses a set of instructions, not assembled into code, to store data for the program. Since there are different instructions available to different assemblers, Croaker uses only those available on most assemblers. Croaker uses the following codes:

- ORG tells the assembler to start assembling code at the memory location specified in the operand.
- EQU sets a label to the value specified by the operand. For example, the command START SET 300 would set the label START to a value of 300.
- FCB stores a 1-byte code at the current position. For example, if the assembler was assembling code at memory location 7000, and it encountered

**CCEAD**
Eigen Systems, P.O. Box 180006, Austin, TX 78718
$6.95, 16K cassette

**Disk Color Editor and the Macro Conditional Assembler**
Computerware, P.O. Box 668, Encinitas, CA 92024
Disk Color Editor—$29.95, 32K disk; Macro Conditional Assembler—$49.95, 32K disk

**EDTASM+**
Radio Shack, Cat. No. 26-3254, disk; 26-3250, ROM pack
$59.95, 16K disk; $49.95, 16K ROM pack

**Macro 80C and SDS80C**
The Micro Works, P.O. Box 1110, Del Mar, CA 92014
Macro 80C—$99.95, 16K disk; SDS80C—$89.95, ROM pack

*Table 1. A Sampling of Editor/Assemblers*

*Table 2. Color Computer op-codes.*

**ABX**—Add B to register X. This function doesn't require an operand.

**ADCA, ABCB**—Add the value specified in the operand to A/B and add the value of the carry bit in the CC register to the sum. The total is then stored in A/B.

**ADDA, ADDB**—Add the value specified in the operand to A/B. The sum is then stored in A/B.

**ADDD**—Add the value specified in the operand to register D. The sum is then stored in D.

**ANDA, ANDB**—Perform a logical AND between A/B and the value specified in the operand, and store the results in A/B.

**ANDCC**—Perform a logical AND between the condition code register and the value specified in the operand, and store the results in the CC register. This function is useful in changing 1 bit (or one condition) in the CC register.

**ASLA, ASLB** (also LSLA, LSLB)—Shift all the bits in A/B one place left. This causes A/B to be multiplied by two. For example, the command ASLA would multiply A by two. The carry bit in the CC register is loaded with the value of the leftmost bit, and the rightmost bit is set to zero. This function doesn't require an operand.

**ASL** (also LSL)—Shift all the bits in the memory position specified by the operand one place left. This also causes the value in the memory position to be multiplied by two. The carry bit is loaded with the value of the leftmost bit and the rightmost bit is set to zero.

**ASRA, ASRB**—Shift all the bits in A/B one place right. The carry bit in the CC register is loaded with the value of the rightmost bit and the leftmost bit remains constant. Because the leftmost bit remains constant, it is not wise to divide the register by two. You should, instead, use LSRA and LSRB.

**ASR**—Shift all the bits in the memory position specified by the operand one place right. Like ASRA and ASRB, if you want to divide the value in the memory location by two, use LSR, which doesn't require an operand.

**(L)BCC**—Branch to the place specified in the operand if the carry bit in the CC register is clear.

**(L)BCS**—Branch to the place specified in the operand if the carry bit in the CC register is set to one.

**(L)BEQ**—Branch to the place specified in the operand if the result is equal (used after a "compare").

**(L)BGE**—Branch to the place specified in the operand if the result is greater than or equal to zero (used after changing the value of a register).

**(L)BGT**—Branch to the place specified in the operand if the result is greater than zero (used after changing the value of a register).

**(L)BHI**—Branch to the place specified in the operand if the result is higher (used after a "compare").

**(L)BHS**—Branch to the place specified in the operand if the result is higher or same (used after a "compare").

**BITA, BITB**—Perform logical AND between A/B and the value specified in the operand. Condition codes are affected accordingly. This function doesn't change the value of the register or the memory location.

**(L)BLE**—Branch to the place specified in the operand if the result is less than or equal to zero (used after changing the value of a register).

**(L)BLO**—Branch to the place specified in the operand if the result is lower (used after a "compare").

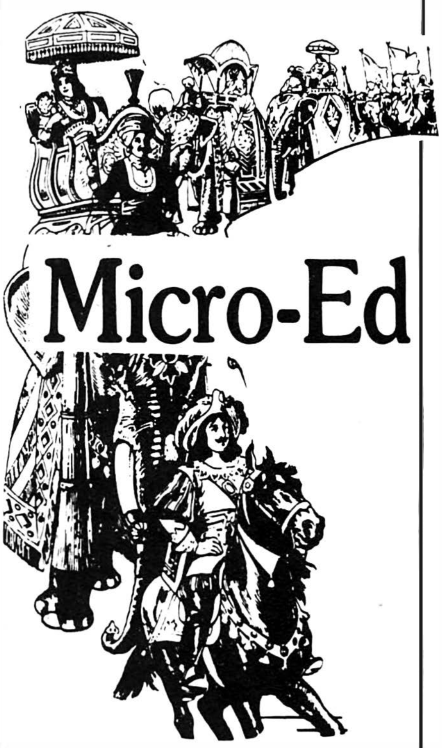
**(L)BLS**—Branch to the place specified in the operand if the result is lower or the same (used after a "compare").

**(L)BLT**—Branch to the place specified in the operand if the result is less than zero (used after changing the value of a register).

**(L)BMI**—Branch to the place specified in the operand if the N bit in the CC register is set to one.

*Table 2 continued*

Join the parade to



Micro-Ed

educational software

Send for free catalog

Specify:

- TRS-80 Model III
- TRS-80 Color Computer

telephone
us at
1-800-MICRO ED

Micro-Ed Inc.
P.O. 444005
Eden Prairie, MN 55344

✓39

*"This program draws a title page for Croaker and saves it on cassette."*

the command FCB 20, it would store a value of 20 at memory location 7000.

- FDB stores a 2-byte code at current position. For example, if the assembler was at memory location 7000 and it encountered the command FDB $AABB, it would store a hexadecimal value of AA at 7000, and a hexadecimal value of BB at 7001.

The third column is used for the operands, additions to the op-codes that specify values, addresses, or registers needed by the op-code. While not all op-codes need operands, most do.

Labels represent addresses and can be used as operands in many cases. A pound sign (#) in front of a label or number tells the computer to use the specific number named. If no pound sign is used, the computer uses the value stored at the address named.

For example, if the computer encountered the command LDA #5, A would be loaded with a value of five. If, however, the computer encountered the command LDA 5, and address five contained a value of 200, A would be loaded with a value of 200. A pound sign is never used at a jump, branch, register shift, or memory-modifying statement.

A dollar sign directly before a number tells the assembler that the number is in hexadecimal (base 16). The dollar sign always goes directly before a hexadecimal number and can be used whereever applicable. If no dollar sign is used, the assembler assumes that the number is decimal (base 10).

If a memory address is in brackets, the computer uses the memory at the address in brackets. For example, if memory addresses 25 and 26 contained the address 4096 and the computer received the command JMP [25] the computer would jump to 4096.

Indexed addressing uses registers and is found in the following forms:

a) ,Register
b) Number,Register
c) ,Register+
d) ,Register++
e) ,–Register
f) ,– –Register
g) Register,Register

They do the following:

*Table 2 continued*

**(L)BNE**—Branch to the place specified in the operand if the result isn't equal (used after a "compare").
**(L)BPL**—Branch to the place specified in the operand if the N bit in the CC register is clear.
**(L)BRA**—Branch to the place specified in the operand (unconditional).
**(L)BRN**—Never branch to the place specified in the operand.
**(L)BSR**—Branch to the subroutine specified in the operand (returned with an RTS).
**(L)BVC**—Branch to the place specified in the operand if overflow bit in the CC register is clear.
**(L)BVS**—Branch to the place specified in the operand if overflow bit in the CC register is set to one.
**CLRA, CLRB**—Clear A/B to zero. This function doesn't require an operand.
**CLR**—Clear the memory location specified in the operand to zero.
**CMPA, CMPB**—Compare A/B to the value specified in the operand.
**CMPD, CMPS, CMPU, CMPX, CMPY**—Compare D/S/U/X/Y to the value specified in the operand.
**COMA, COMB**—Perform a one's complement with A/B and store the result in A/B. This function doesn't require an operand.
**COM**—Perform a one's complement with the value in the memory location specified in the operand. Store the result in the memory location.
**ANDCC**—AND with CC register and wait for an interrupt.
**DAA**—Add hexadecimal number 00, 06, 60, or 66 to A depending on the values of A, the carry bit, and the half-carry bit. This function doesn't require an operand.
**DECA, DECB**—Decrement A/B by one. This function doesn't require an operand.
**DEC**—Decrement the value in the memory position specified in the operand.
**EORA, EORB**—Perform an exclusive OR between A/B and the value in the memory location specified in the operand.
**EXG**—Exchange the values in the two registers specified in the operand.
**INCA, INCB**—Increment A/B by one. This function doesn't require an operand.
**INC**—Increment the value in the memory location specified in the operand by one.
**JMP**—Jump to the place specified in the operand.
**JSR**—Jump to the subroutine specified in the operand. The subroutine is returned with an RTS.
**LDA, LDB**—Load A/B with the value specified in the operand.
**LDD, LDX, LDY, LDU, LDS**—Load D/X/Y/U/S with the value specified in the operand.
**LEAX, LEAY, LEAU, LEAS**—Load X/Y/U/S with the effective address specified in the operand. This function is useful in incrementing registers. LEAX 1,X, for example, would increment register X by one.
**LSRA, LSRB**—Shift all the bits in A/B one place right. The carry bit in the CC register is loaded with the value of the rightmost bit, and the leftmost bit is cleared to zero. This function causes A/B to be divided by two and does not require an operand.
**LSR**—Shift all the bits in the memory location specified by the operand one place right. The carry bit is loaded with the values of the rightmost bit and the leftmost bit is cleared to zero. This causes the value in the memory location to be divided by two.
**MUL**—Multiply the values in A and B and place the result in D.
**NEGA, NEGB**—Negate A/B and store the result in A/B. This function doesn't require an operand.
**NEG**—Negate the value in the memory location specified in the operand and store the result in the memory location.
**NOP**—No operation. This function's only uses are to provide space for data to be entered at a later time and to provide padding for a loop. This function doesn't require an operand.
**ORA, ORB**—Perform an inclusive OR between the contents of A/B and the contents of the memory position specified in the operand. The results are placed in A/B.
**ORCC**—Perform an OR between the CC register and the value stored in the operand. The results are stored in the CC register. This function is also useful for changing the contents of the CC register.
**PSHS**—Push the registers specified in the operand onto the systems stack.
**PSHU**—Push the registers specified in the operand onto the user stack.
**PULS**—Pull the registers specified in the operand from the systems stack.
**PULU**—Pull the registers specified in the operand from the user stack.
**ROLA, ROLB**—Shift all the bits in A/B one place to the left. The rightmost bit is loaded with the value of the carry bit and the leftmost bit is then stored in the carry bit. This function doesn't require an operand.
**ROL**—Shift all the bits in the memory location specified in the operand one place to the left. The rightmost bit is loaded with the value of the carry bit and the leftmost bit is then stored in the carry bit.
**RORA, RORB**—Shift all the bits in A/B one place to the right. The leftmost bit is loaded with the value of the carry bit and the rightmost bit is then stored in the carry bit. This function doesn't require an operand.
**ROR**—Shift all the bits in the memory location specified in the operand one place to the right. The leftmost bit is loaded with the value of the carry bit and the rightmost bit is then stored in the carry bit.

*Table 2 continued*

*Table 2 continued*

**RTI**—Return from interrupt. This is used to return from a hardware interrupt.
**RTS**—Return from subroutine. This is used to return from a subroutine called from either a JSR or a BSR.
**SBCA, SBCB**—Subtract the value stored in the operand from A/B and then subtract the value of the carry bit. The result is stored in A/B.
**STA, STB**—Store A/B at the place specified by the operand.
**STD, STX, STY, STU, STS**—Store D/X/Y/U/S at the place specified by the operand.
**SUBA, SUBB**—Subtract the value stored in the operand from A/B and store the result in D.
**SUBD**—Subtract the value stored in the operand from D and store the result in D.
**SWI, SWI2, SWI3**—Software interrupts.
**SYNC**—Stop processing commands until a hardware interrupt is called.
**TFR**—Transfer one register into another. The two registers are placed in the operand.
**TSTA, TSTB**—Test A/B for a value of zero or a negative value and change the condition codes accordingly. This function doesn't require an operand.
**TST**—Test the memory location specified by the operand for a value of zero or a negative value and change the condition codes accordingly.

*END*

a) LDA ,X—Load A with what's at X.
b) LDA 50,X—Load A with what's at X + 50.
c) LDA ,X+—Load A with what's at X and increment X by 1.
d) LDA ,X++—Load A with what's at X and increment X by 2.
e) LDA ,−X—Decrement X by 1 and load A with what's at X.
f) LDA ,−−X—Decrement X by 2 and load A with what's at X.
g) LDA B,X—Load A with what's at X + B.

You can use any register in place of the X and B registers in the examples. This type of addressing is used in many of the op-codes and is useful for other tasks.

The fourth column is for your own comments. You can write them in English, and the assembler ignores them. Leave these comments out to save memory when typing in programs from magazines (including this series). In your own programming they will be helpful references.

If you place an asterisk at the beginning of a line, the assembler ignores the entire line and you can use it for comments. The asterisk in the assembler is used as the REM statement is used in Basic. You can also omit these comments when typing in programs from magazines.

This month's Program Listing is written in Extended Basic and doesn't require an assembler. Since the remainder of the programs will be in Assembly language, you will probably want to get an assembler (Table 1).

This program draws a title page for Croaker and saves it on cassette. I recommend that you save the program on one cassette and the title page on another. You can then save subsequent programs one after another, making it easier to attach the programs at the end of the series.

Next month you will enter all the data necessary for Croaker's graphics and music routines.

If you have any questions or comments, contact me at the following address and please include a self-addressed, stamped envelope. ■

---

*Address correspondence to Mike Meehan, 1300 Fairfield Drive, Clearwater, FL 33546.*

NEW!

For Your TRS-80 Color Computer

128 Full-time Audio Talk/Tutor Programs!

You may be able to reduce your taxes by
- income averaging
- income splitting
- tax shelter

Which?
1 sister
2 smaller

One-syllable adjectives that end in y usually just add ly.
Which has one syllable?
1 icy
2 sly

We're Your Educational Software Source

LANGUAGE ARTS
Spelling (16 programs)
Level 3-4 (16 programs)
(words in context with definitions and synonyms)
Phonics (16 programs)
English as a Second Language (32 programs)
MATHEMATICS
Levels 1-6 Numbers (16 programs)
Basic Algebra (16 programs)
SCIENCE & TECHNOLOGY
Physics (16 programs)

In Color, with Pictures and Text!

All of our TRS-80 Color programs have easy to understand professional announcer narration, not synthesized, robotic voices. All text is displayed in easy to read upper- and lower-case characters. Video clearly illustrates key concepts in each frame of the program.

Only **$4.40** per program.(**$8.80** for 2, one on each side of a half-hour cassette). **$59.00** for 16 programs (8 cassettes) in an album. Send for a catalog of over 1000 programs for Atari, TRS-80, Apple, etc.

For more information, or to order call:
TOLL FREE 1-800-654-3871

DORSETT ✓209
Educational Systems, Inc.
Box 1226, Norman, OK 73070

# RACETRACK

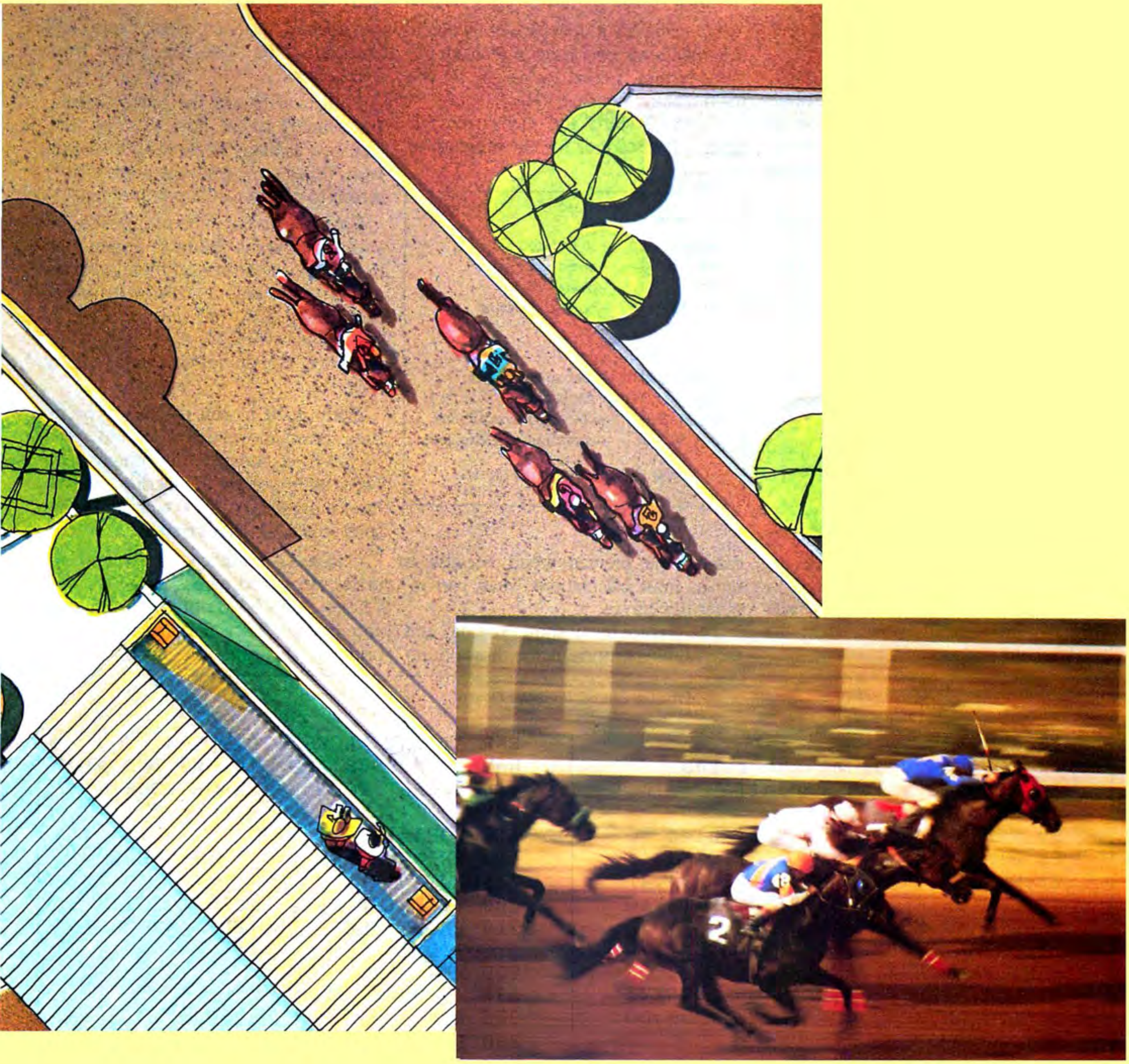
## Move up to your CoCo and place your bets. The odds are good with a trackside simulation.

### By Glen Tapanila

Got betting in your blood? Now you can gamble on horses without risking your money; you don't even have to drive out to the racetrack. Just sit down at your CoCo and play Bringmee Downs.

Bringmee Downs is a small racetrack in an obscure northern state. This program simulates a racing season at Bringmee Downs. You have a stable of horses and a pot of money, and your goal is to make winners of your horses and, consequently, more money.

There are four races each racing day, one racing day a week, and 10 weeks in the racing season. You own four horses out of a field of 40 and start with $10,000. You choose which horse to enter in which race and who to hire as a jockey. There are entry fees, jockey fees, and purses for first and second finishes. You can bet up to $500 on any horse (even against your own). Winning bets pay 2-to-1 and place bets pay 1½-to-1. Trainer, feed, and board cost you $250 a week.



Handicappers agree there are many factors in a horserace. So it is at Bringmee Downs. You need to consider past performances of each horse, speed rating, class of race, distance, track conditions, fatigue, and jockey. All races here are strictly on the up-and-up.

**Instructions**

Type in the program and run it. The first screens welcome you to the program and ask you to name your horses. To maintain uniformity of displays, you have to use four-letter names. After you name all four horses, the main menu presents six choices.

Choice 1 triggers the daily setup process. As the day goes on, the class of race increases as do entry fees and payoffs.

The horses running in handicaps are generally better than those in allowances and claimers. The first two races each day are claimers ($8,000 and $16,000). The third race is an allowance, and the fourth is a handicap stakes.

The daily setup screen displays day number, race number, class, distance of each race, and weather forecast.

Each race display asks if you want to enter a horse. Type N and press enter if

*System Requirements*

**32K RAM**
**Extended Color Basic**
**Printer (optional)**

you do not, or type and enter a Y if you do.

If you type Y, the next screen asks you for the number of your horse, or an H to view horse history. You can see as many histories as you wish and enter an R from this screen to return to the setup process.

Choose a horse and a jockey. (A jockey can ride in any number of races a day.) Enter a J to see the jockey screen with fees per race. The screen displays your jockey choice for confirmation, and you can enter an N to change jockeys.

Choice 2 shows you background on any horse. Enter the horse's number (from 1 to 40). The horse-history screen shows the name; number of firsts, seconds, and total races; average speed score; and the last day the horse ran.

Speed is a relative measurement. A speed score of 100 is given to the fastest time ever recorded at that distance at that track. A point is subtracted for each fifth of a second off the record. A speed score of 90 means the horse ran the race two seconds slower than the track record.

You can view more histories by entering more numbers. Enter an R from the horse-history screen to return to the main menu.

Choice 3 starts the day's races. It takes a few seconds for the program to display the prerace menu because it makes most calculations when you request this choice.

| Wins | |
|---|---|
| under 4 | —so bad, too sad |
| 5–8 | —about as expected |
| 9–12 | —doing well |
| over 12 | —born to the game |

| Money | |
|---|---|
| under 10,000 | —stick to computers |
| 10,001–15,000 | —not bad |
| 15,001–20,000 | —you might have a future |
| over 20,000 | —contact me at Derby time |

*Table 1. Bringmee Downs Ratings*

The prerace menu shows you day and race numbers, horse name, horse number, jockey, distance, class, purse, and track condition. You can choose from four actions.

Enter a J to see the jockey screen. Enter an H to see horse history. You can view as many horse histories as you wish. Enter an R from the horse-history screen to return to the prerace menu.

Enter a B to bet. The program shows you the horses in the race. Type in the number of the horse you want to bet on and type the amount you want to bet from $5 to $500 (do not use a dollar sign). Then type 1 for a win or a 2 for a place bet. You do not have to bet on any race.

Enter an R to run the race. The results screen shows the order and speed of finish. If you bet, the program displays your bet payoff or loss. If you have a printer, type a P to print the results screen for later reference.

Choice 4 displays the numbers, prices, wins, and names of the jockeys. Choice 5 shows you how much money you have. Choice 6 is for those with printers. It prints the names of the

*Program Listing. Bringmee Downs*

```
10 REM ***
20 REM * a year at the races
30 REM * by Glen Tapanila
40 REM ***
50 REM * initialize variables
60 DIMH$(40):DIMH(40,15):DIMJ$(1
0):DIMJ(10,4):DIMR$(4):DIMR(4,4)
:DIMRN(20,4):DIMJS(5):DIMR1(4):D
IMR2(4):DIMSC(5,4):DIMBE(4,3)
70 DATAAAA,BBBB,CCCC,DDDD,ONYX,L
ILY,OPAL,PARK,PASA,SLOT,SLOU,COR
P,CLAR,AUBE,AURA,BRAN,BULL,INKY,
LEAR,MEAN,XERO,YUGA,DUNK,TRUM,DO
LL
80 DATATRAN,WEBB,RAJA,DECI,STIR,
NIMM,MILL,YULE,NUTT,TELE,ORLY,CH
AT,TIFF,BEAN,MIST
90 DATAYAMADA,SMYTHE,RODRIGES,TA
PANILA,MERCKLE,JACKSON,CHAN,SKIP
SON,RITHIE,KLEGG
100 DATA300,1400,500,400,1900,75
0,500,3000,900,900,5000,1500
110 DATA"$800 CLAIMING","1600 CL
AIMING","ALLOWANCE","HANDICAP ST
AKES"
120 FORI=1TO40:READH$(I):NEXT
130 FORI=1TO10:READJ$(I):J(I,4)=
300:NEXT
140 FORI=1TO4:READR(I,1),R(I,2),
R(I,3):NEXT
150 FORI=1TO4:READR$(I):NEXT
160 FORI=1TO40:H(I,9)=-200:NEXT
170 CLS:PRINT@32,"WELCOME TO A Y
EAR AT THE RACES":PRINT@64,"YOU
HAVE 4 HORSES AND $10,000":PRINT
@96,"FIRST YOU MUST NAME YOUR HO
RSES"
180 FORI=1TO4
190 PRINT"HORSE # "I" IS CALLED
":INPUTH$(I)
200 IFLEN(H$(I))=4 THEN GOTO220
210 PRINT"USE 4 LETTER NAME ONLY
":GOTO190
220 NEXT
230 M=10000
240 REM * start the races
260 REM * print main menu
270 CLS:K=1
280 PRINT@33,"A YEAR AT THE RACE
S":PRINT@99,"ENTER THE NUMBER OF
":PRINT@131,"THE PROCESS YOU WAN
T":PRINT@161,"1. SET UP THE DAYS
 RACES":PRINT@193,"2. HORSE HIST
ORY":PRINT@225,"3. START THE DAY
S RACES":PRINT@257,"4. JOCKEY ST
ANDINGS"
290 PRINT@289,"5. HOW MUCH MONEY
 DO I HAVE"
300 PRINT@321,"6. PRINTOUT OF HO
RSES"
310 PRINT @385,"ENTER # OF ";
320 INPUT"PROCESS";P
330 IFP=1ANDSO=1 THEN CLS:PRINT@
481,"RACES ARE ALREADY SET UP":G
OTO280
340 IFP=3ANDSO=0 THENCLS:PRINT@4
80,"MUST SET UP RACES BEFORE RUN
```

*Listing continued*

horses, number of wins, places, and races, amount of winnings, and average speed.

After 10 days of races the year is over. Entering a 1 from the main menu brings up the last screen, which shows the number of races your horses won and how much money you have.

## Racing Tips

Past performances are important. If you have a printer, print the results of each race for reference. If not, make frequent use of the horse-history screen. Performance at each class, distance, and track condition is important.

A periodic printout of all horses from choice 6 is very handy. Jockeys are important, but cost goes up with a better jockey. Intelligent betting can greatly increase your pot of money. Likewise, bad luck and large bets can deplete it. Horses get fatigued if they race all the time.

## The Program

The formula for determining who is going to win was empirically derived. I examined three days of October races (not counting maiden races) at Longacres Racetrack in Renton, WA, and codified information from the *Daily Racing Form*. I then computed coefficients for a multiple regression equation.

I added a couple of farckle factors to the multiple-regression formula for playability. (A farckle factor is an arbitrary quantity applied to hard data to push results in the desired direction.)

Arrays H(40,15) for horses and J(10,4) for jockeys hold data from race to race. This data goes into the formula to calculate scores for each horse in the race. A random factor averaging about two-thirds of the standard error of estimate from the Longacres data is added or subtracted from each score. Scores are sorted in descending order to find the order of finish.

You can change the racing days per year by editing line 440. If you do not have a printer, disable the PRINT #-2 commands by making lines 2880, 2910, and 2930–3000 REM remarks.

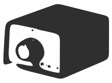
If you are ambitious, you can build in code to buy horses or to have your horses bought in the claimers. Table 1 gives some guidelines to gauge your finish. ■

---

*If you have questions concerning Racetrack address correspondence to Glen R. Tapanila, 316 Laurelhurst Drive, Tumwater, WA 98501.*

**ELIMINATE CABLE SWAPPING**
At a price NO ONE can beat!

**NEW!**



**TRANSFER SWITCH FEATURES**

- CO-SWITCH lets your COCO SAFELY SHARE MULTIPLE I/O devices Or one device to multiple COCO's (up to 11)
- Features highest quality rotary type switch
- Two-tone case has DIN connectors (FEMALE) on back
- Great for printer, etc Cable options available

**MODELS AVAILABLE:**

| | |
|---|---|
| PI-50C 2-way (1 in-2 out) | $29 95 ea |
| PI-54C 4-way (1 in-4out) | $39 95 ea |
| PI-58C 8-way (1 in-8 out) | $69 95 ea |
| PI-51C 11-way (1 in-11 out) | $79 95 ea |

**TERMS:** Cash, check, M/C, Visa Add $2 each for shipping UPS 2nd day AIR add $3 C O D add $2 per order

SERIAL and CENTRONICS switches available Please call for the fastest delivery and best price on all your custom switching needs

Available from **The Smart Link:**
**SAB-LINK, Inc.**
**7301 NW 41 Street Miami, FL 33166**
**Dealer inquiries welcome!** **(305) 592-6092**

✓538

**COLOR COPY**

COLCOPY is a menu driven copy utility that copies data files or programs: disk to tape, tape to disk or disk to disk. It also kills files or programs.

Many options are provided: copies basic programs, machine language programs or data files, allows selection by groups of filenames or extensions, individual files by menu selection, writes multiple copies of files to tape, backup a disk to tape, restore a disk from tape, copies files in alphabetic sequence and much more.

Written in basic with machine language subroutines. Includes program on cassette and instructions.

Requires 32K, DOS. ONLY $18pp

Send check or money-order to:

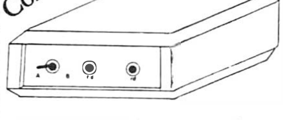
**COCOPRO**
**P.O. BOX 37022**
**ST. LOUIS, MO 63141**
Postage paid on all pre-paid orders in U.S.
Missouri residents add 5 625 percent sales tax

✓308

**DEALER INQUIRES INVITED**

TRS-80*
Color Computers

**"SCAN ● OUT"**
**$24.95**
Made in USA



A' to B' Switch
RS 232 Analizer

TRS... MODEM | "SCAN●OUT" | TRS... MODEM
PRINTER | CPU | PRINTER
PLOTTER | | PLOTTER

Constant Monitoring.
Built in A' to B' Selector.
Stays in line.
Software Compatible.
Assembled Plastic Enclosure.
Line Cords included.

Designed for all
color Computers
(incl. MC-10)

**ORDER NOW**
ONLY $24.95
(add $2.00 for shipping)
(FL Residents add $1.25 tax)

C.O.D. ORDERS ACCEPTED (813) 595-2853

**National Research Group, Inc.**
**11580 Oakhurst Rd.**
**Largo, FL 33544**

✓323

*Multiple unit discount (4 or more) call for free quote and save!*
** TRS-80 color computer is a registered trademark of Tandy Corp.*

**SELECTED SOFTWARE FOR THE COLOR COMPUTER**

**HARDWARE DISCOUNTS:**
**Take 10% off the price of two or 15% off the price of 4 or more!**

***Upgrade Your Color Computer!***
Complete solderless kits with easy-to-follow instructions.

| | |
|---|---|
| **4K-16K** For All Boards | $19.95 |
| **4K-32K** For All Boards | $54.95 |
| **16K-32K** For All Boards | $39.95 |
| **64K** For E & F Boards and Color Computer 2 | $59.95 |

***If possible, specify board revision with order.***

**Note: All ICs used in our kits are first quality 200NS Prime Chips and carry one full year warranty.**

**'REAL TALKER'**
**COLORWARE** Voice Synthesizer
with Votrax chip ready to plug in & talk. Comes with software on cassette & user's manual.
Cartridge $59.95

**SOFTWARE DISCOUNTS**
**Take 10% off the price of one, 15% off the price of two or 20% off the price of 4 or more!**
**All programs are in 16K machine language unless noted.**

**DATA SOFT**

| | TAPE | DISK |
|---|---|---|
| • **ZAXXON** (32K) Sega official version. | $39.95 | $39.95 |
| •• **POOYAN** (32K) Konami official version. Cassette & disk included. | $29.95 | $29.95 |
| •• **MOON SHUTTLE** Nichibutsu official version. Cassette & disk included. | $29.95 | $29.95 |

**TOM MIX SOFTWARE**

| | | |
|---|---|---|
| • **TOUCHSTONE** (32K) Outstanding! | $27.95 | $30.95 |
| • **BUZZARD BAIT** (32K) Outstanding! | $27.95 | $30.95 |
| • **DONKEY KING** (32K) Outstanding! | $26.95 | – |
| • **TRAP FALL** Just like Pitfalls. | $27.95 | $30.95 |

**SPECTRAL ASSOCIATES**

| | | |
|---|---|---|
| •• **FROGGIE** (32K) The best of its type. | $24.95 | $26.95 |
| • **LUNAR ROVER PATROL** (32K) | $24.95 | $28.95 |
| • **CUBIX** (32K) Excellent. | $24.95 | $28.95 |
| • **LANCER** (32K) Excellent Joust-type. | $24.95 | $28.95 |
| • **MS. GOBBLER** (32K) Outstanding! | $24.95 | $28.95 |
| • **WHIRLYBIRD RUN** Excellent. | $24.95 | $28.95 |
| • **GHOST GOBBLER** Highly rated! | $21.95 | – |

**INTRACOLOR**

| | | |
|---|---|---|
| • **CANDY CO.** (32K) Coming Soon! | – | – |
| •• **COLORPEDE** Just like the arcade. | $29.95 | $34.95 |
| • **ROBOTTACK** Just like the arcade. | $24.95 | $27.95 |

**COMPUTERWARE**

| | | |
|---|---|---|
| • **JUNIOR'S REVENGE** (32K) | $28.95 | $31.95 |
| • **GRAN PRIX** (32K) Challenging race. | $21.95 | $24.95 |
| • **DOODLE BUG** Just like Ladybug. | $26.95 | $29.95 |

**ANTECO SOFTWARE**
ROMPAK ONLY

| | |
|---|---|
| • **8-BALL** For the pool-table lover. | $29.95 |
| • **GHOST GOBBLER** by Spectral Asso. | $26.95 |
| • **WHIRLYBIRD RUN** by Spectral Asso. | $26.95 |

**ADVENTURE INTERNATIONAL**

| | | |
|---|---|---|
| **SAIGON: THE FINAL DAYS** | $24.95 | – |
| **ADVENTURELAND** | $19.95 | – |
| **EARTHQUAKE** Excellent. | $24.95 | – |
| •• **TRIAD** (32K) Excellent arcade game. | $34.95 | – |
| •• **SEA DRAGON** (32K) Outstanding! | $34.95 | – |

**RAINBOW CONNECTION SOFTWARE**
**RAINBOW SCREEN MACHINE**
Tape $29.95 Disk $32.95
Extended Basic Required.

**SUPER SCREEN MACHINE**
Tape $44.95 Disk $47.95
Extended Basic Required.

***Please note:***
*Software & hardware cannot be mixed for discount.*
***Requires Joystick** ****Joystick Optional**

**We pay postage on all orders in the U.S. & Canada.**
Overseas add $3.00. (MN Res. add 6% sales tax.)
We accept Visa, Mastercard, check or money order.
U.S. funds only for foreign orders.
C.O.D. please add $2.00.

**Send to: SELECTED SOFTWARE**
Dept. H, P.O. Box 32228
Fridley, MN 55432

✓205

*Listing continued*

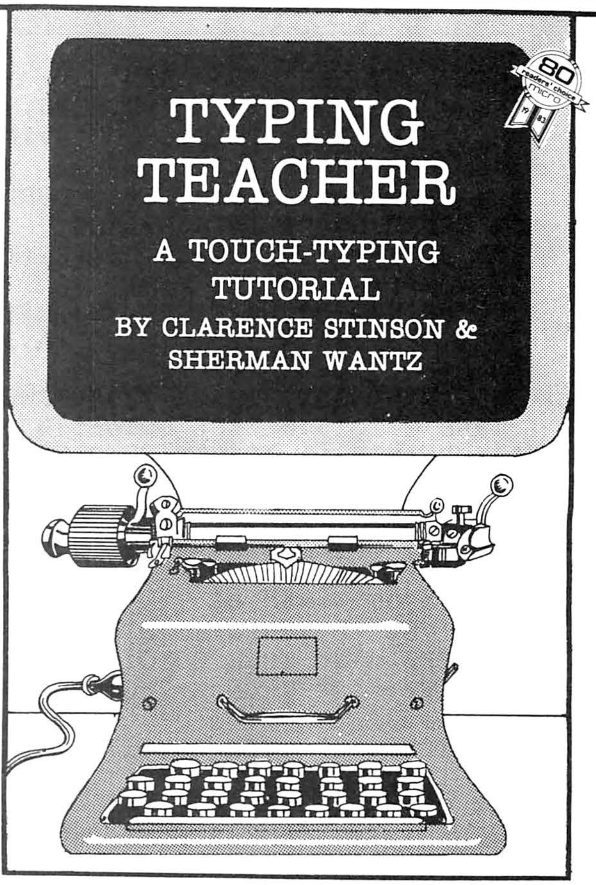
```
NING":GOTO280
350 ON P GOTO390,1070,1180,2650,
2730,2850
360 CLS:PRINT@481,"INVALID CHOIC
E, TRY AGAIN":GOTO280
370 IFBE(A,1)=0 THEN BP=0:GOTO22
70
380 REM * setup the days races
390 M=M-250
400 FORI=1TO20:RN(I,1)=0:RN(I,2)
=0:NEXT
410 WE=RND(5):IFWE=1 THEN W$="RA
IN" ELSE W$="FAIR"
420 DY=DY+1:HC=0
425 IFDY>10 THEN GOTO 2770
430 FORA=1TO4
440 L=RND(2):IFL=1 THEN L$="6 FU
RLONGS" ELSE L$="1 1/16 MILES"
450 R(A,4)=L
460 CLS:PRINT@8,"BRINGMEE DOWNS"
:PRINT@40,"DAY "DY" RACE "A
470 PRINT@69,R$(A)
480 PRINT@101,"LENGTH IS "L$
490 PRINT@133,"WEATHER FORECAST
IS "W$
500 PRINT@165,"WINNER GETS $";:P
RINTUSING"####";R(A,2)
510 PRINT@197,"PLACE  GETS $";:P
RINTUSING"####";R(A,3)
520 PRINT@259,"COST OF ENTRY IS
$"R(A,1)
530 PRINT@323,"'Y'= ENTER A HORS
E":PRINT@355,"'N'= CONTINUE"
540 INPUT"===>";E$
550 IFE$="Y" THEN GOTO570
560 IFE$="N" THEN GOTO580 ELSE G
OTO460
570 GOSUB620:GOTO590
580 JK=0:Y2=1:GOSUB910:GOTO590
590 NEXTA
600 GOTO270
610 REM * player enters a race
620 CLS
630 PRINT@7,"DAY "DY" RACE "A
640 PRINT@67,"TYPE IN NUMBER OF"
:PRINT@99,"HORSE YOU WANT ENTERE
D":PRINT@133,"OR":PRINT@163,"'H'
= HORSE HISTORY"
650 INPUT"===>";HS$
660 IFHS$="H" THEN K=2:GOSUB1070
:CLS:GOTO630
670 HS=VAL(HS$)
680 IFHS<1ORHS>4 THEN GOTO690 EL
SE GOTO700
690 CLS:PRINT@417,"INVALID ENTRY
":PRINT@449,"ENTER 1, 2, 3, 4 OR
 H":GOTO630
700 IF(HS=RN(1,1))OR(HS=RN(6,1))
OR(HS=RN(11,1))OR(HS=RN(16,1)) T
HEN GOTO710ELSEGOTO720
710 CLS:PRINT@352,"I AM SORRY, B
UT YOU HAVE":PRINT@384,"ALREADY
ENTERED THAT HORSE":PRINT@416,"I
N A RACE.  PASS OR":PRINT@448,"E
NTER ANOTHER HORSE":GOTO630
720 HC=HC+1:RN(HC,1)=HS:CLS
730 PRINT@128,"ENTER THE NUMBER
OF THE":PRINT@160,"JOCKEY YOU WA
NT TO RIDE":PRINT@192,H$(HS)
740 PRINT@227,"OR":PRINT@256,"TY
PE 'J' TO SEE JOCKEYS"
750 INPUT"===>";JC$
760 IFJC$="J" THEN K=2:GOSUB2650
:CLS:GOTO730
770 JC=VAL(JC$)
780 IF(JC<1ORJC>10) THEN GOTO790
 ELSE GOTO800
790 CLS:PRINT@448,"ENTER A NUMBE
R BETWEEN 1 & 10":GOTO730
800 CLS:PRINT@64,"YOU HAVE CHOSE
N "J$(JC)
810 PRINT@192,"HIS FEE IS $"J(JC
,4):PRINT@256,"ENTER AN 'N' IF Y
OU":PRINT@288,"WANT ANOTHER JOCK
EY"
820 INPUT"===>";JC$
830 IFJC$="N" THEN GOTO840 ELSE
GOTO850
840 CLS:GOTO730
850 RN(HC,2)=JC:JS(1)=JC:M=M-J(J
C,4)-R(A,1)
860 IFM<0 THEN GOTO870 ELSE GOTO
880
870 FORXX=1TO1000:CLS:PRINT@96,"
LOSE THIS ONE AND YOU'RE":PRINT@
128,"IN HOCK BIG FELLA":NEXTXX
880 JK=1:Y2=2:GOSUB910
890 RETURN
900 REM * fill out the race card
910 Y1=1
920 JK=JK+1:IFJK>5 THEN GOTO1050
930 HC=HC+1
940 HN=RND(40):IFHN<5 THEN GOTO9
40
950 FORY=1TO(HC-1):IFHN=RN(Y,1)
THEN GOTO940
960 NEXTY
970 RN(HC,1)=HN
980 JP=RND(10)
990 FORZ=1 TO(Y1)
1000 IFJP=JS(Z) THEN GOTO980
1010 NEXTZ
1020 JS(Y2)=JP:RN(HC,2)=JP
1030 Y1=Y1+1:Y2=Y2+1
1040 GOTO920
1050 SO=1:RETURN
1060 REM * horse history
1070 CLS:PRINT@33,"ENTER THE NUM
BER OF THE HORSE":PRINT@65,"YOU
WANT INFORMATION ABOUT":PRINT@97
,"===>":INPUTHN
1080 IFHN<1ORHN>40 THEN GOTO 107
0
1090 CLS:PRINT@72,H$(HN)"  NUMBE
R "HN:PRINT@164,"# 1STS ";:PRINT
USING"###";H(HN,1)
1100 PRINT@196,"# 2NDS ";:PRINTU
SING"###";H(HN,2):PRINT@228,"# R
```

*Listing continued*

*Listing continued*

```
ACES";:PRINTUSING"###";H(HN,7):P
RINT@290,"SPEED AVERAGE ";:PRINT
USING"###.#";H(HN,9)
1110 PRINT@322,"LAST RACE     ";
:PRINTUSING"###";H(HN,12):PRINT@
386,"ENTER ANOTHER NUMBER  OR"
1120 PRINT@418,"TYPE 'R' TO RETU
RN"
1130 INPUTZ$
1140 IFZ$="R" THEN GOTO1150 ELSE
 HN=VAL(Z$):GOTO1080
1150 IFK=2 THEN GOTO1170
1160 GOTO270
1170 K=1:RETURN
1180 REM * run the days races
1190 WF=RND(4):IFWF=1 THEN GOTO1
200 ELSE GOTO 1210
1200 IFWE>1 THEN WE=1 ELSE WE=2:
GOTO 1220
1210 IFWE>1 THEN WE=2
1220 FORX=1TO4:FORY=1TO3:BE(X,Y)
=0:NEXTY:NEXTX
1230 FORX=1TO20:HR=RN(X,1)
1240 IFX<6 THEN D=R(1,4)+9:GOTO1
270
1250 IFX<11 THEN D=R(2,4)+9:GOTO
1270
1260 IFX<16 THEN D=R(3,4)+9 ELSE
 D=R(4,4)+9
1270 IFX<6 THEN C=3:GOTO1300;:PR
INTUSING"#######";RN((CT+V),1)
1280 IFX<11 THEN C=4:GOTO1300
1290 IFX<16 THEN C=5 ELSE C=6
1300 IFH(HR,2)>1 THEN S=2 ELSE S
=H(HR,2)
1310 JN=J((RN(X,2)),2)
1320 C1=0:C2=0
1330 IF(H(HR,14)+2)>C THEN C1=1:
C2=0
1340 IF(H(HR,14)+2)<C THEN C1=0:
C2=1
1350 IFH(HR,1)>1 THEN F=2 ELSE F
=H(HR,1)
1360 IFWE=1 AND H(HR,13)=1 THEN
MU=1 ELSE MU=0
1370 T=0:IF DY/3<H(HR,7) THEN T=
1
1380 IFDY/2<H(HR,7) THEN T=2
1390 RM=0:FORY=1TO4:B1=RND(84):B
2=RND(2):IFB2=2 THEN RM=RM-B1 EL
SE RM=RM+B1:NEXTY
1400 RM=RM/100
1410 RN(X,3)=RM+.53*H(HR,8)-.08*
H(HR,C)-.44*H(HR,D)+.24*JN-.01*H
(HR,9)+.1*C1+.12*C2+.3*F+.04*S-.
25*MU+.12*T+10
1420 NEXTX
1430 FORA=1TO4:FORX=1TO2:BE(A,B)
=0:NEXTX:NEXTA
1440 CT=-5:SO=0
1450 FORA=1TO4:CT=CT+5
1460 CLS:U=96:U1=114
1470 PRINT@7,"BRINGMEE DOWNS":PR
INT@40,"DAY"DY"RACE"A:PRINT@96,"
```

*Listing continued*



**VOTED ONE OF THE TOP THREE EDUCATIONAL PROGRAMS OF 1983 BY 80 MICRO READERS!**

Find out what 80 Micro readers discovered long ago. . . Typing Teacher by Instant Software Inc., is one of the best educational programs of 1983!

This complete seven-part package takes you from initial familiarization with the keyboard, through typing words and phrases, to complete mastery of the keyboard.

On-screen diagrams show you the correct placement for fingers and the programs include practice sessions to develop coordination. Your computer becomes a bottomless page for typing practice. The lessons are tailored to the keyboard, but train you to use any standard typewriter.

Advance from the awkward hunt and peck method to smooth, free-flowing, touch-typing with the Typing Teacher program.

Available for the TRS 80:

| | | |
|---|---|---|
| Mod I & Mod III | Tape (99R) | 17.95 |
| | Disk (451RD) | 22.95 |
| Color Computer | Tape (464RC) | 17.95 |
| Model 100 | Tape (463RH) | 17.95 |

INSTANT
SOFTWARE INC. ✓450

Peterborough NH 03458

To Order: Call toll free 1•800•843•6700 NH residents call 1•924•9261 use your VISA, MASTER CARD, AMEX, or mail your check (we pay shipping) to Instant Software.

*Listing continued*

```
HORSE    NUMBER   JOCKEY"
1480 FORV=1TO5:U=U+32:PRINT@U,H$
(RN((CT+V),1));:PRINTUSING"#####
####";RN((CT+V),1)
1490 IFR(A,4)=1 THEN L$="6 FURLO
NGS" ELSE L$="1 1/16 MILES"
1500 U1=U1+32:PRINT@U1,J$((RN((C
T+V),2))):NEXT
1510 PRINT@289,L$:PRINT@303,R$(A
):PRINT@322,R(A,2)"TO WIN"R(A,3)
"TO PLACE"
1520 PRINT@352,"TRACK IS ":IFWE=
1 THEN GOTO1540 ELSE GOTO1530
1530 PRINT@361,"FAST":GOTO1550
1540 PRINT@361,"MUDDY":GOTO1550
1550 PRINT@384,"'R'= RUN RACE
    'B'= BET":PRINT@416,"'H'= HO
RSE HISTORY  'J'=JOCKEYS"
1560 INPUT"===>";B$
1570 IFB$="B" THEN GOTO1610
1580 IFB$="H" THEN GOTO1780
1590 IFB$="J" THEN K=2:GOSUB2650
:GOTO1460
1600 IFB$="R" THEN GOTO1790 ELSE
 GOTO1460
1610 CLS
1620 PRINT@3,"ENTER NUMBER OF HO
RSE":PRINT@35,"YOU WANT TO BET O
N":U=68:FORV=1TO5
1630 U=U+32:PRINT@U,H$(RN((CT+V)
,1))" # IS";:PRINTUSING"###";RN(
(CT+V),1):NEXTV
1640 INPUT"===>";HB
1650 FORV=(CT+1) TO (CT+5):IFHB=
RN(V,1) THEN GOTO1680
1660 NEXTV
1670 CLS:PRINT@450,"TRY AGAIN":G
OTO1620
1680 CLS
1690 PRINT@3,"YOU CAN BET FROM $
5 TO $500":INPUT"HOW MUCH?";AB
1700 IFAB<5ORAB>500 THEN GOTO171
0 ELSE GOTO1720
1710 CLS:PRINT@450,"ENTER AMOUNT
 AGAIN":GOTO1690
1720 CLS
1730 PRINT@1,"ENTER 1 FOR WIN OR
 2 FOR PLACE"
1740 INPUT"===>";BT
1750 IFBT<1ORBT>2 THEN GOTO 1760
 ELSE GOTO1770
1760 CLS:PRINT@450,"'1' OR '2' O
NLY":GOTO1730
1770 BE(A,1)=AB:BE(A,2)=BT:BE(A,
3)=HB:GOTO1460
1780 K=2:GOSUB1070:GOTO1460
1790 HN=CT+1
1800 SC(1,1)=RN(HN,3):SC(1,2)=RN
(HN,1):SC(1,4)=RN(HN,2)
1810 Y1=1
1820 FORX= (HN+1) TO (HN+4)
1830 Y=0:Y1=Y1+1
1840 FORZ= Y1 TO2 STEP-1
1850 IFY=1 THEN GOTO1900
1860 IFSC((Z-1),1)>RN(X,3)GOTO18
80
1870 SC(Z,1)=RN(X,3):SC(Z,2)=RN(
X,1):SC(Z,4)=RN(X,2):Y=1:GOTO190
0
1880 SC(Z,1)=SC((Z-1),1):SC(Z,2)
=SC((Z-1),2):SC(Z,4)=SC((Z-1),4)
1890 IFZ=2 THEN SC((Z-1),1)=RN(X
,3):SC((Z-1),2)=RN(X,1):SC((Z-1)
,4)=RN(X,2)
1900 NEXTZ
1910 NEXTX
1920 IFA=1 THEN C=3:GOTO1950
1930 IFA=2 THEN C=4:GOTO1950
1940 IFA=3 THEN C=5 ELSE C=6
1950 D=R(A,4)+9
1960 SC(1,3)=102-RND(40):SC(5,3)
=SC(1,3)-RND(40):SD=SC(1,3)-SC(5
,3)
1970 SC(4,3)=SC(5,3)+.25*SD:SC(3
,3)=SC(5,3)+.5*SD:SC(2,3)=SC(5,3
)+.75*SD
1980 WN=SC(1,2):PL=SC(2,2):SH=SC
(3,2):FO=SC(4,2):FI=SC(5,2)
1990 H(WN,1)=H(WN,1)+1:H(PL,2)=H
(PL,2)+1
2000 H(WN,C)=H(WN,C)+1:IFH(WN,C)
>1 THEN H(WN,C)=1
2010 H(PL,C)=H(PL,C)+1:IFH(PL,C)
>1 THEN H(PL,C)=1
2020 H(WN,D)=H(WN,D)+1:IFH(WN,D)
>1 THEN H(WN,D)=1
2030 H(PL,D)=H(PL,D)+1:IFH(PL,D)
>1 THEN H(PL,D)=1
2040 H(WN,7)=H(WN,7)+1:H(PL,7)=H
(PL,7)+1:H(SH,7)=H(SH,7)+1:H(FO,
7)=H(FO,7)+1:H(FI,7)=H(FI,7)+1
2050 H(WN,8)=((H(WN,7)-1)*H(WN,8
)+1)/H(WN,7)
2060 H(PL,8)=((H(PL,7)-1)*H(PL,8
)+2)/H(PL,7)
2070 H(SH,8)=((H(SH,7)-1)*H(SH,8
)+3)/H(SH,7)
2080 H(FO,8)=((H(FO,7)-1)*H(FO,8
)+4)/H(FO,7)
2090 H(FI,8)=((H(FI,7)-1)*H(FI,8
)+5)/H(FI,7)
2100 H(WN,9)=(((H(WN,7)-1)*H(WN,
9))+SC(1,3))/H(WN,7)
2110 H(PL,9)=(((H(PL,7)-1)*H(PL,
9))+SC(2,3))/H(PL,7)
2120 H(SH,9)=(((H(SH,7)-1)*H(SH,
9))+SC(3,3))/H(SH,7)
2130 H(FO,9)=(((H(FO,7)-1)*H(FO,
9))+SC(4,3))/H(FO,7)
2140 H(FI,9)=(((H(FI,7)-1)*H(FI,
9))+SC(5,3))/H(FI,7)
2150 H(WN,12)=DY:H(PL,12)=DY:H(S
H,12)=DY:H(FO,12)=DY:H(FI,12)=DY
2160 IFWE=1 THEN H(WN,13)=1
2170 H(WN,14)=A:H(PL,14)=A:H(SH,
14)=A:H(FO,14)=A:H(FI,14)=A
2180 H(WN,15)=H(WN,15)+R(A,2)
2190 H(PL,15)=H(PL,15)+R(A,3)
```

*Listing continued*

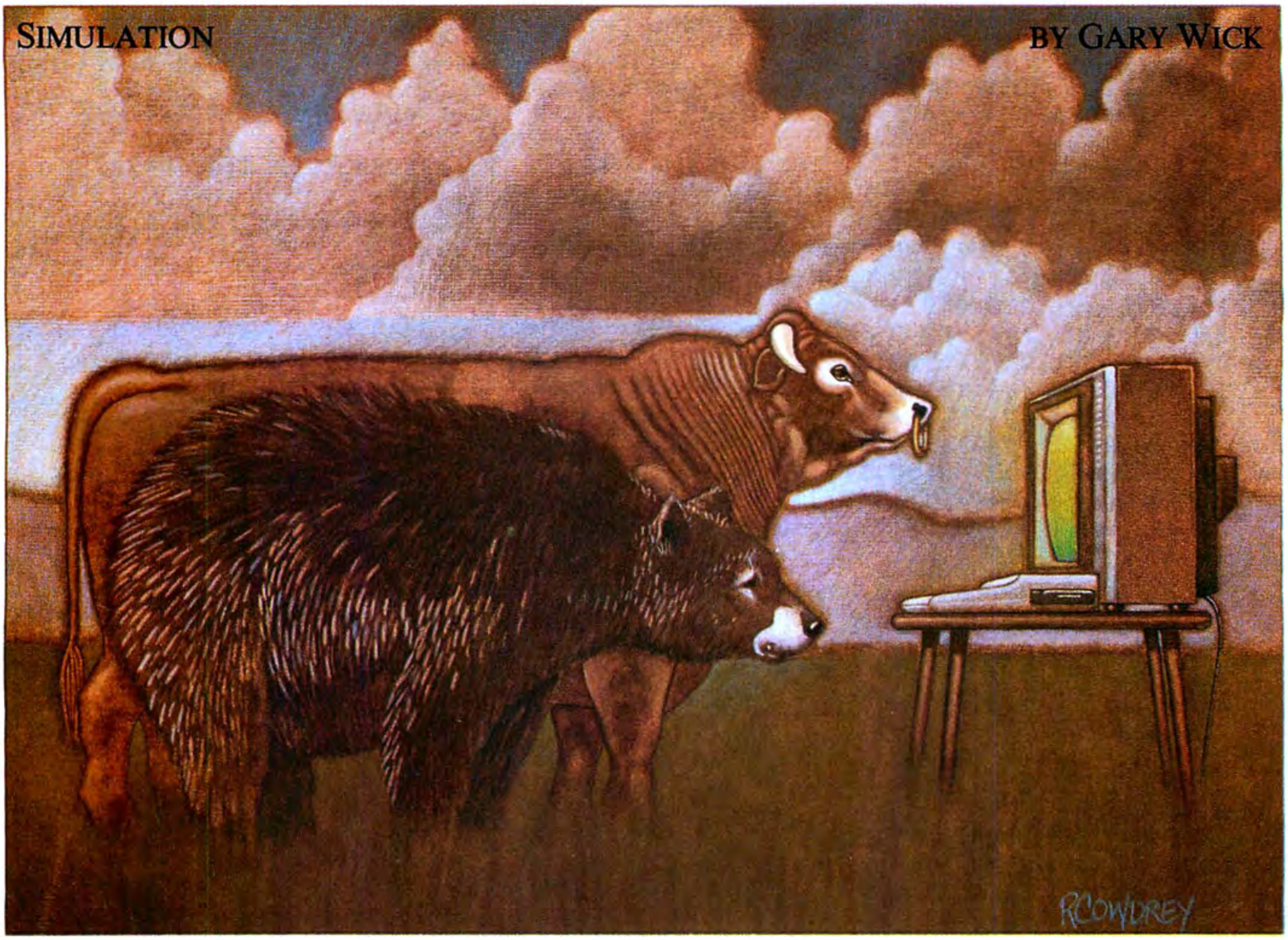
*Listing continued*

```
2200 IFWN<5 THEN M=M+R(A,2)
2210 IFPL<5 THEN M=M+R(A,3)
2220 IFBE(A,2)=0 THEN GOTO2230 E
LSE GOTO2240
2230 BP=0:GOTO2270
2240 IFBE(A,2)=1 AND WN=BE(A,3)
THEN M=M+BE(A,1):BP=1:GOTO2270
2250 IF(BE(A,2)=2)AND((WN=BE(A,3
))OR(PL=BE(A,3))) THEN M=M+BE(A,
1)*.5:BP=2:GOTO2270
2260 M=M-BE(A,1):BP=3
2270 WN=SC(1,4):PL=SC(2,4):SH=SC
(3,4):FO=SC(4,4):FI=SC(5,4)
2280 J(WN,3)=J(WN,3)+1
2290 J(WN,1)=J(WN,1)+1:J(PL,1)=J
(PL,1)+1:J(SH,1)=J(SH,1)+1:J(FO,
1)=J(FO,1)+1:J(FI,1)=J(FI,1)+1
2300 J(WN,2)=(((J(WN,1)-1)*J(WN,
2))+1)/J(WN,1)
2310 J(PL,2)=(((J(PL,1)-1)*J(PL,
2))+2)/J(PL,1)
2320 J(SH,2)=(((J(SH,1)-1)*J(SH,
2))+3)/J(SH,1)
2330 J(FO,2)=(((J(FO,1)-1)*J(FO,
2))+4)/J(FO,1)
2340 J(FI,2)=(((J(FI,1)-1)*J(FI,
2))+5)/J(FI,1)
2350 CLS
2360 PRINT@5,"DAY"DY"RACE"A
2370 PRINT@70,"R E S U L T S"
2380 PRINT@160,"HORSE       #  SP
EED  JOCKEY"
2390 U=161:U1=180:FORX=1TO5
2400 U=U+32:U1=U1+32:PRINT@U,H$(
SC(X,2));:PRINTUSING"#######";SC
(X,2);:PRINTUSING"#####.#";SC(X,
3);:PRINT@U1,J$(SC(X,4)):NEXTX
2410 IFBP=0 THEN GOTO2440
2420 IFBP=1 THEN GOTO2450
2430 IFBP=2 THEN GOTO2460 ELSE G
OTO2470
2440 PRINT@354,"NO BET":GOTO2480
2450 PRINT@354,"YOUR BET PAYS  "
;:PRINTUSING"$####";BE(A,1)*2:GO
TO2480
2460 PRINT@354,"YOUR BET PAYS  "
;:PRINTUSING"$####";BE(A,1)*1.5:
GOTO2480
2470 PRINT@354,"YOUR BET LOSES
";:PRINTUSING"$####";BE(A,1)
2480 PRINT"PRESS ENTER TO CONTIN
UE"
2490 PRINT"'P' = PRINTOUT OF THI
S RACE"
2500 INPUT XX$
2510 IFXX$="P" THEN GOSUB2890
2520 NEXTA
2530 FORA=1TO10
2540 IFJ(A,2)<1.5 THEN J(A,4)=50
0:GOTO2620
2550 IFJ(A,2)<2 THEN J(A,4)=450:
GOTO2620
2560 IFJ(A,2)<2.5 THEN J(A,4)=40
0:GOTO2620
2570 IFJ(A,2)<3 THEN J(A,4)=350:
GOTO2620
2580 IFJ(A,2)<3.5 THEN J(A,4)=30
0:GOTO2620
2590 IFJ(A,2)<4 THEN J(A,4)=200:
GOTO2620
2600 IFJ(A,2)<4.5 THEN J(A,4)=15
0:GOTO2620
2610 J(A,4)=100
2620 NEXTA
2630 GOTO270
2640 REM * jockey standings
2650 CLS
2660 PRINT@1,"JOCKEYS AND COST P
ER RACE":PRINT@65,"#  PRICE  WIN
S   NAME":U=68:FORX=1TO10:U=U+32
2670 PRINTUSING"##";X:PRINT@U,J(
X,4);:PRINTUSING"#####";J(X,3):P
RINT@(U+14),J$(X):NEXT
2680 INPUT"===>";XX
2690 IFK=2 THEN GOTO2710
2700 GOTO270
2710 K=1:RETURN
2720 FRM ** display of money
2730 CLS:PRINT@130,"YOU HAVE $"M
2740 INPUT"===>";XX
2750 GOTO270
2760 REM * close the year
2770 TW=H(1,1)+H(2,1)+H(3,1)+H(4
,1):RR=(DY-1)*4
2780 CLS
2790 PRINT@2,"THE RACING YEAR AT
"
2800 PRINT@34,"BRINGMEE DOWNS IS
 OVER"
2810 PRINT@66,"YOU HAVE $"M
2820 PRINT@98,"YOUR HORSES WON"T
W"RACES"
2830 PRINT@130,"OUT OF"RR"RACES"
2840 END
2850 FORI=1TO40
2860 PRINT#-2,H$(I)I" WINS= "H(I
,1)" 2NDS= "H(I,2)" RACES= "H(I,
7)" WINNINGS= "H(I,15)" SPEED= "
H(I,9)
2870 NEXT
2880 GOTO270
2890 PRINT#-2," ":PRINT#-2," DAY
 "DY" RACE "A
2900 IFWE=1 THEN GOTO2910 ELSE G
OTO2920
2910 PRINT#-2,"TRACK IS MUDDY":G
OTO2930
2920 PRINT#-2,"TRACK IS FAST"
2930 PRINT#-2,L$
2940 PRINT#-2,"  R E S U L T S"
2950 PRINT#-2,"HORSE   #  SPEED
  JOCKEY"
2960 FORX=1TO5
2970 PRINT#-2,H$(SC(X,2))"    "SC
(X,2)"   "SC(X,3)"  "J$(SC(X,4))
:NEXT
2980 PRINT#-2," "
2990 RETURN
```

*END*

SIMULATION

BY GARY WICK



# STOCK MARKET SIMULATOR

## Have an itch to invest the family fortune? Play the game without risking your dollars with this simulation.

Thinking of investing some of your cash in the stock market now that Wall Street is hopping? If you're a beginner, play Stock Market Simulator before you decide to throw your savings into the market. This simulator might save you hundreds of dollars, and help you gain insight into prudent investing.

Before you play the game, look at the elements of stock market investing. Forget about the complicated aspects such as selling short, buying on margin, puts and calls, Ginnie Maes, and commodity trading. Those are for the experienced investors who can afford to lose thousands at a time. Stick to the simple concepts of Wall Street.

First, a few definitions:

- Bull Market—prices for stocks are high, so values go up.
- Bear Market—prices for stocks are low, so values go down.
- Mixed Market—prices for most stocks are steady. Some prices go up, others down.
- Dow Jones Average—an antiquated number arrived at by averaging the performance of a few choice stock groups. The Dow Jones is used as a barometer of the stock market. If it's high, the market is considered safe and healthy. If it's low, approach the market with caution.
- Speculating—buying stock that is selling cheaply in hopes that the price will rise. There are other forms of speculating that you will learn as you become more experienced.

Strategy in the market is simple—buy low, sell high. This is an easy concept to understand, but difficult to follow because stocks usually don't behave predictably. There is no concrete method of selecting a stock that will rise in value and give you profit. The only way to make money in the market is with knowledge of how it works, experience, and, of course, money.

In real life, there are numerous devices you use to tell the good stocks from the dogs. Among these are company profit reports, economic indicators, and hundreds of different types of charts. Investors have used every type of advice from economic statistics to astrological charts.

A better approach than palm readers is to use common-sense strategy in buying and selling stocks. The following are basic guidelines:

- Buy low, sell high.
- Choose a stock whose value will stay steady in a Bear market.

*System Requirements*

**16K RAM**
**Extended Color Basic**

- Avoid speculating unless you can afford to lose.
- Follow the business news closely.

| Lines | Description |
|---|---|
| 10–650 | display title, screen, and game rules. |
| 660 | XX = number of economic situations created by the CoCo. |
| 690 | DW is initial value for the Dow Jones Average. |
| 710 | X = number of companies in game. |
| 720–960 | dimensions stocks and their base values. |
| 1020–1520 | buy routine. |
| 1530–1840 | sell routine. |
| 1850–2120 | go-to-jail routine. |
| 2130–2360 | sell subroutine. |
| 2370–2700 | affect the prices of entire market routine. |
| 2700–2780 | millionaire routine. |
| 2790–2920 | displays DW Average and number of trading days. |
| 2930–4470 | data. Data format is situation, company number, price index for company that is numbered. |

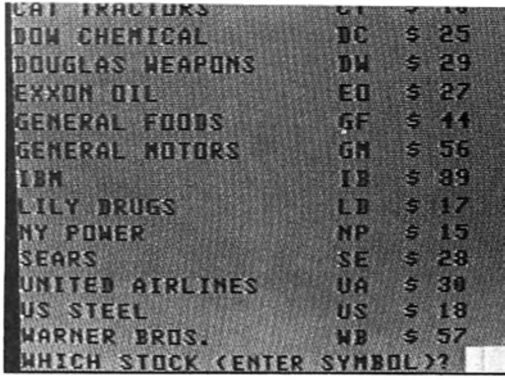
*Table 1. Line Description*

Economic conditions affect the market. For example, if auto sales drop, stock prices of auto makers will probably do likewise.

- Be brave, but not stupid. If the Bear market is chewing up the value of your stocks, it might be best to sell unless you have good reason to think that the trend will reverse.
- Get advice and help from a stockbroker you can trust.

Some experts will support this advice, others will not, but no matter what advice you get, remember that the final decision in buying and selling stocks is yours.

Stock Market Simulator can help you learn the basic workings of the market. The object of the game is to earn $1 million in the least amount of trading days. You begin with $10,000. The simulator has three phases: Buy stock, Sell stock, and the CoCo, which creates economic conditions and actions that will affect stock prices. Type PCLEAR1 before loading the game.



```
CAT TRACTORS            CT
DOW CHEMICAL            DC  $ 25
DOUGLAS WEAPONS         DW  $ 29
EXXON OIL               EO  $ 27
GENERAL FOODS           GF  $ 44
GENERAL MOTORS          GM  $ 56
IBM                     IB  $ 89
LILY DRUGS              LD  $ 17
NY POWER                NP  $ 15
SEARS                   SE  $ 28
UNITED AIRLINES         UA  $ 30
US STEEL                US  $ 18
WARNER BROS.            WB  $ 57
WHICH STOCK (ENTER SYMBOL)?
```

Unlike real trading, you get no interest from your stocks; you just buy and sell. To keep you on your toes, however, the CoCo sends you to jail if you try to buy stocks without sufficient funds or sell stock that you don't own. Also, the simulator charges you broker fees of $30 for each buy transaction and $40 for each sell transaction. If it seems the prices of some stocks aren't logical, don't worry. Most investors feel that way much of the time since stocks behave irrationally. ■

---

*Address correspondence to Gary Wick, 1434 Rutledge St., Madison, WI 53703.*

*Program Listing. The Stock-Market Simulator*

```
10 'XX=SITUATIONS,X=#COMPANIES
20 CLS(0)
30 XX=63
40 FOR X=1 TO 32:
50 XX=XX+1
60 PRINT@XX,CHR$(36);:IF XX>=95
THEN 90:
70 SOUND 190,1
80 NEXT X
90 XX=96
100 FOR X=1 TO 13
110 XX=XX+31+P
120 P=1
130 PRINT@XX,CHR$(36);:IF XX>=48
0 THEN 160
140 SOUND 190,1
150 NEXT X
160 XX=479
170 FOR X=1 TO 32
180 XX=XX+1
190 PRINT@XX,CHR$(36);:IFXX>=511
 THEN 220
200 SOUND 190,1
210 NEXT X
220 XX=1
230 P=0
240 FOR X=1TO14
250 XX=XX+31+P
260 P=1
270 PRINT@XX,CHR$(36);:IF XX>=51
1 THEN 300
280 SOUND 190,1
290 NEXT X
300 PRINT@173,"the";
310 PRINT@234,"stockmarket";
320 PRINT@301,"game";
330 XX=-1
340 FORX=1 TO 500:NEXTX
350 FORX=1TO480
360 XX=XX+1
370 PRINT@XX,CHR$(36):IFXX>=511T
HEN400
380 SOUND 195,1
390 NEXTX
400 FORAQ=1TO200:NEXTAQ
410 CLS(0)
420 PRINT"do you want instructio
ns";:INPUTA$:A$=LEFT$(A$,1):IF A
$="Y" THEN GOTO430 ELSE660
430 CLS(3)
440 PRINT"OBJECTIVE OF THE GAME
IS EASY-";
450 PRINT:PRINT"MAKE MONEY BY BU
YING AND";
460 PRINT:PRINT"SELLING STOCKS."
;
470 PRINT@420,"ENTER ANY KEY TO
CONTINUE";
480 I$=INKEY$:IF I$="" THEN 480
ELSE 490
490 CLS(3)
500 PRINT"THE STOCK PRICES ARE A
FFECTED";
510 PRINT:PRINT"BY REAL LIFE SIT
UATIONS THAT";
520 PRINT:PRINT"ARE CREATED BY T
HE COMPUTER.";
```

Listing continued

*Listing continued*

```
530 PRINT@420,"ENTER ANY KEY TO
CONTINUE";
540 I$=INKEY$:IF I$=""THEN540 EL
SE550
550 CLS(3)
560 PRINT"THE DOW JONES AVERAGE
CHANGES";
570 PRINT:PRINT"AFTER EVERY TURN
.";
580 PRINT:PRINT"YOU MAY PLAY UNT
IL YOU EARN AS";
590 PRINT:PRINT"MUCH AS YOU CAN.
";
600 PRINT@420,"ENTER ANY KEY TO
CONTINUE";:I$=INKEY$:IFI$=""THEN
 600 ELSE 610
610 CLS(3):PRINT"GOOD LUCK & GOO
D EARNINGS";
620 PRINT:PRINT"BUT WATCH OUT FO
R THE...";:PRINT@234,"bear marke
t";
630 PRINT@420,"PRESS ANY KEY TO
CONTINUE";
640 I$=INKEY$:IF I$=""THEN640 EL
SE650
650 CLS(7):PRINT"PLEASE ENTER y
OR n TO ANSWER":PRINT:PRINT"THE
COMPUTER. IT WILL SAVE TIME.";:F
ORX=1 TO 1000: NEXT X
660 XX=149
670 AD=0
680 AD=0
690 DW=800
700 ' INITIALIZE VALUES AND STRI
NGS
710 X=14
720 DA=0
730 AC=10000
740 DIM S$(X):DIM BV(X):DIM SY$(
X)
750 DIMSO(X):DIMCV(X)
760 FOR T=1 TO X
770 DATA AMTRACK,CAT TRACTORS,DO
W CHEMICAL,DOUGLAS WEAPONS,EXXON
 OIL
780 DATA GENERAL FOODS,GENERAL M
OTORS,IBM,LILY DRUGS,NY POWER
790 DATA SEARS,UNITED AIRLINES,U
S STEEL,WARNER BROS.
800 READ S$(T)
810 NEXT T
820 FOR T=1 TO X
830 DATA 40,40,25,30,27,44,57,89
,17,15,30,30,18,55
840 READ BV(T)
850 NEXT T
860 FOR T=1 TO X
870 DATA AM,CT,DC,DW,EO,GF,GM,IB
,LD,NP,SE,UA,US,WB
880 READ SY$(T)
890 NEXT T
900 FOR T=1 TO X
910 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0,0
920 READ SO(T)
930 NEXT T
940 FOR T=1 TO X
950 READ CV(T)
960 DATA  40,40,25,30,27,44,57,8
9,17,15,30,30,18,55
970 NEXT T
980 CLS(6)
990 FOR SD=100TO200STEP10
1000 SOUND SD,1
1010 NEXT SD
1020 INPUT "DO YOU WANT TO SEE Y
OUR          PORTFOLIO (Y/N)";P$
1030 IF P$="Y" THEN  GOTO 1390 E
LSE 1040
1040 FOR SD=100 TO 200 STEP 20
```

*Listing continued*

- Integrates Keyboard and Monitor
- Accepts TC130 or similar color video receiver
- Useable with Cartridges or Floppy Disk/Controller
- Lifts and tilts Monitor for easier viewing
- Custom molded of reinforced fiberglass
- Silver-Gray or Off-White finish

*$37.50 plus $2.50 shipping & handling*
*NYS residents add 7% sales tax*

**Syracuse R & D Center**
**P.O. Box 125**
**Dewitt, NY 13214**
**(315) 437-4089**

174

**TRS-80**
COMPUTER
**DISCOUNTS**

- Factory Direct
- Best Prices Anywhere
- No Out-of-State Taxes
- 100% Radio Shack Warranty
- Free Price List

**SCOTT TASSO ASSOCIATES**

**175 E North Delsea Drive**
**Vineland, N.J. 08360**
**800-257-0426**
**NJ 609-691-7100**

510

**Subscription Problem?**

*Hot CoCo* does not keep subscription records on the premises, therefore calling us only adds time and doesn't solve the problem.

Please send a description of the problem and your most recent address label to:

HOT CoCo
Subscription Dept.
PO Box 975
Farmingdale, NY 11737

Thank you and enjoy your subscription

Listing continued

```
1050 SOUND SD,1
1060 NEXT SD
1070 IF P$="Y" THEN GOTO 1390
1080 CLS(3)
1090 FOR SD=100TO200STEP10
1100 SOUND SD,1
1110 NEXT SD
1120 'BUY ROUTINE"
1130 INPUT "DO YOU WANT TO BUY S
TOCKS";Y$
1140 IF Y$="Y" THEN GOTO 1150 EL
SE GOTO 1490
1150 CLS(2)
1160 FOR SD=100TO200STEP5
1170 SOUND SD,1
1180 NEXT SD
1190 FOR T=1 TO X
1200 PRINT S$(T)TAB(20)SY$(T)TAB
(24)"$"CV(T)
1210 NEXT T
1220 INPUT"WHICH STOCK (ENTER SY
MBOL)";E$
1230 FOR I=1 TO X
1240 IF E$=SY$(I) THEN 1280
1250 NEXT I
1260 CLS
1270 GOTO 1130
1280 CLS(3)
1290 FOR SD=100TO200STEP8
1300 SOUND SD,1
1310 NEXT SD
1320 PRINT"HOW MANY SHARES OF
                    "S$(I);:INPUT
 V
1330 AC=AC-V*(CV(I))-30
1340 IF AC<1 THEN GOTO 1850
1350 SO(I)=SO(I)+V
1360 V=0
1370 CLS
1380 GOTO 1040
1390 CLS(0)
1400 FOR SD=100TO200STEP7
1410 SOUND SD,1
1420 NEXT SD
1430 PRINT"CASH"TAB(24)"$"AC
1440 FOR T=1TOX
1450 IF SO(T)<1 THEN GOTO 1470
1460 PRINT S$(T)TAB(20)SO(T)TAB(
26)"$"CV(T)
1470 NEXT T
1480 GOTO 1130
1490 CLS (6)
1500 FOR SD=100TO200STEP10
1510 SOUND SD,1
1520 NEXT SD
1530 INPUT"DO YOU WANT TO SEE YO
UR           PORTFOLIO(ENTER Y/N)
";P$
1540 CLS(5)
1550 FOR SD=100TO200STEP9
1560 SOUND SD,1
1570 NEXT SD
1580 IF P$="Y" THEN GOTO 2130
1590 'SELL ROUTINE
```

```
1600 INPUT"DO YOU WANT TO SELL S
TOCKS";Y$
1610 IF Y$<>"Y" THEN GOTO 2250
1620 CLS
1630 FOR SD=100TO200STEP10
1640 SOUND SD,1
1650 NEXT SD
1660 FOR T= 1 TO X
1670 PRINTS$(T)TAB(20)SY$(T)TAB(
24)"$"CV(T)
1680 NEXT T
1690 SOUND 120,10
1700 PRINT"WHICH STOCK TO SELL (
SYMBOL)":INPUT E$
1710 FOR I= 1 TO X
1720 IF E$=SY$(I) THEN 1760
1730 NEXT I
1740 CLS(5)
1750 GOTO 1600
1760 CLS(5)
1770 FOR SD=100TO200STEP10
1780 SOUND SD,1
1790 NEXT SD
1800 PRINT"HOW MANY SHARES OF
                   "S$(I);:INPUTV
1810 AC=AC+V*(CV(I))-40
1820 SO(I)=SO(I)-V
1830 IF SO(I)<0 THEN GOTO 1990
1840 GOTO 1490
1850 CLS(4)
1860 PRINT @0, "NOT ENOUGH  CASH
 TO BUY!";
1870 FOR T=1TO150:NEXT T
1880 PRINT@64, "THIS IS ILLEGAL!
";
1890 FOR T=1 TO 150:NEXT T
1900 PRINT @128, "YOU ARE SENT T
O PRISON!";
1910 FOR T=1 TO 150:NEXT T
1920 PRINT@192, "YOU LOSE YOUR A
SSETS, FRIENDS              AND TH
E GAME!";
1930 FOR DN=1 TO 10
1940 FOR SD=10TO100STEP5
1950 SOUND SD,1
1960 NEXT SD
1970 NEXT DN
1980 GOTO1980
1990 CLS(8)
2000 PRINT@0,"YOU SOLD STOCK THA
T YOU           DON'T OWN!"
2010 FORT=1 TO 200:NEXT T
2020 PRINT@96,"IT'S ILLEGAL TO D
O THAT!";
2030 FOR T=1 TO 200:NEXT T
2040 PRINT@160,"YOU GO TO PRISON
 FOR            7 YEARS!";
2050 FOR T=1 TO 200:NEXT T
2060 PRINT@288,"YOU LOSE YOUR AS
SETS,           FRIENDS AND GAME
!!";
2070 FOR DN=1 TO 5
2080 FOR SD= 10 TO 100 STEP 3
2090 SOUND SD,1
```

Listing continued

*Listing continued*

```
2100 NEXT SD
2110 NEXT DN
2120 GOTO2120
2130 CLS(5)
2140 FOR SD= 100 TO 200 STEP10
2150 SOUND SD,1
2160 NEXT SD
2170 PRINT"CASH"TAB(24)"$"AC
2180 FORT=1 TO X
2190 IF SO(T)<1 THEN GOTO 2210
2200 PRINT S$(T)TAB(20)SO(T)TAB(
2)"$"CV(T)
2210 NEXT T
2220 PRINT"DO YOU WANT TO SELL S
TOCK?":INPUT Y$
2230 IF Y$="Y" THEN GOTO 1620
2240 CLS (6)
2250 IF DD=1 THEN GOTO2310
2260 DIMA$(XX):DIMCA(XX):DIMC(XX
)
2270 FOR T=1 TO XX
2280 READ A$(T),CA(T),C(T)
2290 NEXT T
2300 DD=1
2310 CLS(6)
2320 FOR T= 1 TO 3
2330 N=RND(XX): IF N=0 THEN N= N
+1
2340 PRINTA$(N)
2350 CV(CA(N))=CV(CA(N))+C(N)
2360 NEXT T
2370 'AFFECT ENTIRE MARKET ROUTI
NE
2380 A=RND(3)
2390 IF A=0 THEN A=1
2400 IF A=1 GOTO 2640
2410 IF A=2 THEN GOTO 2570
2420 PRINT"MIXED MARKET";
2430 SOUND 150,3
2440 M=RND(2)
2450 IF M=0 THEN M=1
2460 IF M=1 THEN GOTO 2520
2470 DW=DW+1
2480 FOR T=1 TO X
2490 CV(T)=CV(T)+1
2500 NEXT T
2510 GOTO 2700
2520 FOR T=2 TO X  STEP2
2530 CV(T)=CV(T)-1
2540 NEXT T
2550 DW=DW-1
2560 GOTO 2700
2570 PRINT"BULL MARKET";
2580 SOUND 200,5
2590 D=RND(3):DW=DW+5+D
2600 FOR T=1 TO X
2610 CV(T)=CV(T)+2
2620 NEXT T
2630 GOTO 2700
2640 PRINT"BEAR MARKET";
2650 SOUND 50,5
2660 D=RND(4):DW=DW-4-D
2670 FOR T= 1TO X
2680 CV(T)=CV(T)-2
2690 NEXT T
2700 PRINT@360,"dow jones AT..."
;:PRINT@377,DW;:PRINT@448,"ENTER
 ANY KEY TO CONTINUE GAME.";
2710 IF AC>999999 THEN GOTO 2720
 ELSE GOTO 2790
2720 FORX=1TO4:CLS(X):PRINT@197,
"YOU'RE A MILLIONAIRE";
2730 A$="T4;O4;L8;G;L4;G;L8;G;L8
;G"
2740 B$="L8;F#;L8;G;L4;A;L2;G"
2750 C$="XA$;XB$;"
2760 PLAY C$
2770 NEXT X
2780 END
2790 FORT=1TOX
2800 IF CV(T)<1 THEN CV(T)=1
2810 NEXT T
2820 I$=INKEY$:IF I$="" THEN 282
0 ELSE GOTO2830
2830 AD=0
2840 FOR T=1TOX
2850 AD=AD+(SO(T)*CV(T))
2860 NEXTT
2870 AD=AD+AC
2880 DA=DA+1
2890 CLS(5)
2900 PRINT@130,"YOUR ASSETS ARE
 $"AD;
2910 PRINT@390,DA" DAYS OF TRADI
NG.";
2920 I$=INKEY$:IF I$=""THEN GOTO
2920 ELSE GOTO980
2930 DATA TRAIN RIDERSHIP DOWN,1
,-1
2940 DATA DOCTORS DENOUNCE ASPIR
IN,9,-1
2950 DATA DEFENSE BUDGET INCREAS
ES,4,+2
2960 DATA STEEL IMPORTS ARE UP,1
3,-3
2970 DATA STARWARS EARNINGS UP,1
4,2
2980 DATA ARCADE GAMES SALES UP,
14,2
2990 DATA 747 CRASHES. KILLS 200
.,12,-2
3000 DATA AUTO SALES INCREASE,7,
2
3010 DATA FARMERS SPENDING LESS,
2,-2
3020 DATA CHINA BUYS TRACTORS,2,
1
3030 DATA MILITARY BUDGET ATTACK
ED,4,-1
3040 DATA MX MISSLE BUDGET DEFEA
TED,4,-2
3050 DATA NUCLEAR PLANT SHUTS DO
WN,10,-2
3060 DATA ELECTRICITY USE UP,10,
2
3070 DATA RETAIL SALES DOWN,11,-
2
3080 DATA HOME COMPUTER SALES UP
```

*Listing continued*

Listing continued

```
,8,+2
3090 DATA AUTO WORKERS ON STRIKE
,7,-1
3100 DATA AM BUILD "SUPERTRAIN",
1,+1
3110 DATA TRAIN RIDERSHIP UP,1,1
3120 DATA PCB IS BANNED,3,-2
3130 DATA GOVERNMENT OK'S PCB US
E,3,+2
3140 DATA NAPALM IS BANNED BY US
A,3,-1
3150 DATA STEEL EXPORTS DOWN,13,
-2
3160 DATA STEEL EXPORTS UP,13,2
3170 DATA AUTO IMPORTS UP,7,-2
3180 DATA AUTO SALES HIT SLUMP,7
,-1
3190 DATA OIL GLUT EXISTS,5,-2
3200 DATA AUTO TRAVEL UP,5,+1
3210 DATA CHRISTMAS SALES UP,11,
+2
3220 DATA GEN FOODS EARNINGS DOW
N,6,-2
3230 DATA DOG FOOD SALES UP,6,1
3240 DATA UTILITY RATE INCREASE
DENIED,10,-1
3250 DATA AIR TRAVEL INCREASES,1
2,2
3260 DATA IBM EARNINGS UP,8,2
3270 DATA JOHN DEERE SALES DOWN,
2,1
3280 DATA CHINA WANTS POWER PLAN
T,10,1
3290 DATA RUSSIA NEEDS FARM MACH
INES,2,1
3300 DATA SPACE PROGRAM NEEDS CO
MPUTERS,8,1
3310 DATA WARNER DECREASE STOCK
SHARES,14,2
3320 DATA MOVIE ATTENDANCE DOWN,
14,-1
3330 DATA FROZEN FOODS SALES UP,
6,1
3340 DATA SAUDIS LOWER OIL PRICE
S,5,-2
3350 DATA SAUDIS RAISE OIL PRICE
S,5,2
3360 DATA JAPAN LIMITS US AUTO I
MPORTS,7,-1
3370 DATA W.GERMANY WANTS MISSLE
S,4,1
3380 DATA NEW INDUSTRIES NEED EL
.POWER,10,1
3390 DATA VIDEO PLAYERS SALES UP
,14,+2
3400 DATA WARNER EARNINGS UP,14,
2
3410 DATA DOW INVENTS NONPOLLUTA
NT SOAP,3,2
3420 DATA DOW EARNINGS DOWN,3,-2
3430 DATA LILY INVENTS NEW MEDIC
INE,9,+2
3440 DATA DOCTORS DENOUNCE NEW M
```

Listing continued

**DYNAMITE+™**

**"THE CODE BUSTER"**

**disassembles any 6809 or 6800 machine code program into beautiful source**

- Learn to program like the experts!
- Adapt existing programs to your needs!
- Convert your 6800 programs to 6809!
- Automatic LABEL generation.
- Allows specifying FCB's, FCC's, FDB's, etc.
- Constants input from DISK or CONSOLE.
- Automatically uses system variable NAMES.
- Output to console, printer, or disk file.
- Available for all popular 6809 operating systems.

FLEX™ $100 per copy; specify 5" or 8" diskette.
OS-9™ $150 per copy; specify 5" or 8" diskette.
UniFLEX™ $300 per copy; 8" diskette only.

For a free sample disassembly that'll convince you DYNAMITE+ is the world's best disassembler, send us your name, address, and the name of your operating system.

**Order your DYNAMITE+ today!**

See your local DYNAMITE+ dealer, or order directly from CSC at the address below. We accept telephone orders from 10 am to 6 pm, Monday through Friday. Call us at 314-576-5020. Your VISA or MasterCard is welcome. Orders outside North America add $5 per copy. Please specify diskette size for FLEX or OS-9 versions.

**Foreign Dealers:**

Australia & Southeast Asia: order from Paris Radio Electronics, 161 Bunnerong Road (PO Box 380) Kingsford, 2032 NSW Australia. Telephone: 02-344-9111.

United Kingdom: order from Compusense, Ltd., PO Box 169, London N13 4HT. Telephone: 01-882-0681.

Scandinavia: order from Swedish Electronics hk AB, Murargatan 23-25, Uppsala S-754 37 Sweden. Telephone: 18-25-30-00.

**Computer Systems Center**
**13461 Olive Blvd.**
**Chesterfield, MO 63017**
**(314) 576-5020**

CSC

✓507

UniFLEX software prices include maintenance for the first year.

DYNAMITE+ is a trademark of Computer Systems Center.

FLEX and UniFLEX are trademarks of TSC.
OS-9 is a trademark of Microware and Motorola.

**Dealer Inquiries welcome.**

*Listing continued*

```
EDICINE,9,-1
3450 DATA NEW DRUG CRIPPLES INFA
NT,9,-5
3460 DATA OVERCOUNTER DRUG SALES
 UP,9,2
3470 DATA GEN MILLS WANTS TO BUY
 GEN FOODS,6,3
3480 DATA GEN FOODS WON'T SELL T
O G MILLS,6,-1
3490 DATA WHEAT SALES UP, 2,1
3500 DATA EL SALVADOR BUYS RIFLE
S,4,2
3510 DATA WAR BREAKS OUT IN MIDE
AST,4,3
3520 DATA COMPUTER SALES UP,8,2
3530 DATA FOREIGN COMPUTER SALES
 UP,8,-2
3540 DATA OIL SHORTAGE CLAIMED,5
,3
3550 DATA WB MUSICAL IS FLOP,14,
-2
3560 DATA R&R RECORD SALES DOWN,
14,-1
3570 DATA C&W RECORD SALES UP,14
,1
3580 DATA R&R RECORD SALES UP,14
,1
3590 DATA C&W RECORD SALES DOWN,
14,-1
3600 DATA PIPELINE TO BE BUILT,1
3,2
3610 DATA NY HAS BLACKOUT,10,-1
3620 DATA NY HAS BROWNOUT,10,-1
3630 DATA NUCLEAR PLANT COSTS RI
SE,10,-1
3640 DATA DOW SUED FOR FAULTY DR
UG,3,-3
3650 DATA NAPALM SALES TO S.E.A.
 UP,3,2
3660 DATA DOW INVENTS NEW PLASTI
C,3,2
3670 DATA RETAIL HOLIDAY SALES O
FF,11,-2
3680 DATA UA MUST PAY BACK TAXES
,12,-1
3690 DATA UA INTRODUCES LOWER RA
TES,12,1
3700 DATA NAVY NEEDS NEW SHIPS,1
3,1
3710 DATA IBM SALES INCREASE,8,2
3720 DATA GM OFFERS REBATE,7,1
3730 DATA GM OFFERS REBATE,7,0
3740 DATA CONSUMER SPENDING DOWN
,11,-1
3750 DATA NEW DW JET IS FAULTY,4
,-1
3760 DATA NEW GF CEREAL SALES UP
,6,2
3770 DATA CHEMICAL EXPLOSION KIL
LS 123,3,-1
3780 DATA LILY'S EARNINGS DOWN,9
,-2
3790 DATA LILY'S EARNINGS UP,9,2
3800 DATA WB'S NEW SF FILM IS SU
CCESS,14,1
3810 DATA STEEL WORKERS STRIKE,1
3,-1
3820 DATA UA INCREASE FARES,12,1
3830 DATA SEARS EARNINGS UP,11,1
3840 DATA NY P&L BORROW $500MILL
ION,10,-1
3850 DATA LILY EARNINGS UP,9,1
3860 DATA IBM BUYS OUT JAPAN COM
PANY,8,1
3870 DATA GM ANNOUNCES REBATE,7,
0
3880 DATA GEN FOODS EARNINGS LEV
EL OFF,6,1
3890 DATA STANDARD OIL LOWERS PR
ICES,5,-1
3900 DATA MILITARY BUDGET CUT BA
CK,4,-2
3910 DATA DOW INVENTS NEW GLASS,
3,2
3920 DATA FARMERS RAISING PRICES
,2,1
3930 DATA TOURISM DECREASE,1,-2
3940 DATA AMTRACK MAY SELL OUT,1
,-3
3950 DATA CAT MAY FILE CHAPTER 1
1,2,-4
3960 DATA DOW MAY BUY OUT DUPONT
,3,0
3970 DATA DOUGLAS WEAPONS ASKS F
OR LOAN,4,-2
3980 DATA HOLIDAY TRAVEL UP,5,1
3990 DATA FAMILIES EAT AT HOME L
ESS,6,-1
4000 DATA AUTO SALES HIT SLUMP,7
,-2
4010 DATA AUTO SALES SLIDE DOWN,
7,-3
4020 DATA AUTO IMPORTS DECREASE
LITTLE,7,1
4030 DATA IBM EARNINGS HIT NEW H
IGH,8,3
4040 DATA IBM IMPROVES COMPUTERS
,8,3
4050 DATA COMPUTER SALES DOWN,8,
-2
4060 DATA TYLENOL SCARE EXISTS,9
,-2
4070 DATA ELECTRIC RATES INCREAS
E,10,2
4080 DATA CLOTHING SALES INCREAS
E,11,1
4090 DATA RETAIL SALES INCREASE
BY 30%,11,3
4100 DATA PRICE WAR DECREASES AI
R FARE.12,0
4110 DATA INDUSTRIAL CONSTRUCTIO
N UP,13,2
4120 DATA VIDEO DISK SALES DOWN,
14,-2
4130 DATA IBM SALES OFF,8,-2
4140 DATA JAPANESE COMPUTER SALE
S UP,8,-2
4150 DATA HOME COMPUTER SALES DO
```

*Listing continued*

*Listing continued*

```
WN,8,-1
4160 DATA NEW WB TV SHOW FLOPS,1
4,-1
4170 DATA LARGE BLOCK OF IBM SOL
D,8,-10
4180 DATA RAIL WORKERS STRIKE,1,
-2
4190 DATA DROUGHT HURTS CORN CRO
P,6,2
4200 DATA BANK LOANS TO FARMERS
DROP,2,-2
4210 DATA DC MUST CLEAN DUMP SIT
E,3,-1
4220 DATA PAKISTAN ASKS US FOR A
RMS,4,1
4230 DATA US BLOCKS ARMS SALES T
O SEA,4,-1
4240 DATA MIDEAST OIL PRICES DRO
P,5,-2
4250 DATA GM RECALLS '83 WAGONS,
7,-2
4260 DATA SMALL CAR SALES UP,7,2
4270 DATA FRANCE SELLS SUPER COM
PUTER,8,-1
4280 DATA LILY DISCOVERS NEW BIR
TH        CONTROL PILL,9,1
4290 DATA LD BCP MAY CAUSE CANCE
R,9,-2
4300 DATA LILY DISCOVERS NEW IND
USTRIAL   SUPERGLUE,9,2
4310 DATA ENVIRONMENTALISTS BLOC
K NEW     NYP DAM,10,-1
4320 DATA UTILITY RATES GET 10%
HIKE OK'D,10,+2
4330 DATA JUMBO JET CRASH KILLS
232 IN LA,12,-1
4340 DATA 5000 STEELWORKERS LAID
 OFF,13,1
4350 DATA 2 MORE STEEL PLANTS CL
OSE,13,-2
4360 DATA STEEL EXPORTS UP,8,2
4370 DATA JAPAN AGREES TO LIMIT
STEEL     EXPORTS TO US,8,2
4380 DATA WB SUED FOR COPYRIGHT
INFRINGE,14,-2
4390 DATA SEARS AUTO SERVICE UP,
11,1
4400 DATA IBM LOSES LAWSUIT FOR
PIRATING  SOFTWARE,8,-3
4410 DATA AFRICAN NATIONS WANT N
EW TRACTORS,2,3
4420 DATA BASEBALL CHEWING GUM S
ALES UP,6,1
4430 DATA NEW NATURAL CEREAL SAL
ES UP,6,1
4440 DATA COLORED CANDY CEREAL S
ALES UP,6,1
4450 DATA DENTIST DENOUNCE SUGAR
 CEREALS,6,-1
4460 DATA CIVIL WAR ERUPTS IN CH
ILE,4,2
4470 DATA BIG CAR SALES DOWN,7,-
4
```

*END*

# + FIRST AID +

**TROUBLE FORMATTING PROGRAMS?**

**Rx: REUSABLE, DOUBLE-SIDED**

**Programmer sketch pad**

**Now it's a breeze to locate any X,Y location at a glance . . . without leaving your program.**

**Each location clearly numbered on erasable laminate. Use it and reuse it for years of accurate word processing and graphics formatting. Instructions included.**

MasterCard VISA

price only **$12.00**
(shipping included)
(Calif. Res. add 6% Sales Tax)

**Excellent for the beginner.** ✓224

SYNTACTICS ®

REDCREST, CALIFORNIA 95569, (707) 722-4280

# STOP PLAYING GAMES

- Calculate odds on HORSE RACES with ANY COMPUTER using **BASIC**.
- SCIENTIFICALLY DERIVED SYSTEM really works. TV Station WLKY of Louisville, Kentucky used this system to predict the odds of the 1980 Kentucky Derby. See *Popular Computing* (February, 1984) for a review of this program. This system was written and used by computer experts and is now being made available to home computer owners. This method is based on storing data from a large number of races on a high speed, large scale computer. 23 factors taken from the "Daily Racing Form" were then analyzed by the computer to see how they influenced race results. From these 23 facts, ten were found to be the most vital in determining winners. NUMERICAL PROBABILITIES of each of these 10 factors were then computed and this forms the basis of this REVOLUTIONARY NEW PROGRAM
- SIMPLE TO USE: Obtain "Daily Racing Form" the day before the races and answer the 10 questions about each horse. Run the program and your computer will print out the odds for all horses in each race. COMPUTER POWER gives you the advantage!
- YOU GET:
  1) Program on cassette or disk.
  2) Listing of BASIC programs for use with any computer.
  3) Instructions on how to get the needed data from the "Daily Racing Form."
  4) Tips on using the odds generated by the program.
  5) Sample form to simplify entering data for each race.

✓247

———————MAIL COUPON OR CALL TODAY———————

**3G COMPANY, INC. DEPT. HT** **(503) 357-5607**
**RT. 3, BOX 28A, GASTON, OR 97119**

Yes, I want to use my computer for FUN and PROFIT. Please send me "Play the Horses" for **$29.95**. Circle the cassette you need: PET/CBM, VIC-20, Color Computer, TRS-80, Sinclair Timex 1000, Atari, Commodore 64 (disk or cassette), Apple (disk or cassette)

Enclosed is: ☐ check or money order ☐ MasterCard ☐ Visa

Card No. ______ Exp. date ______

NAME ______

ADDRESS ______

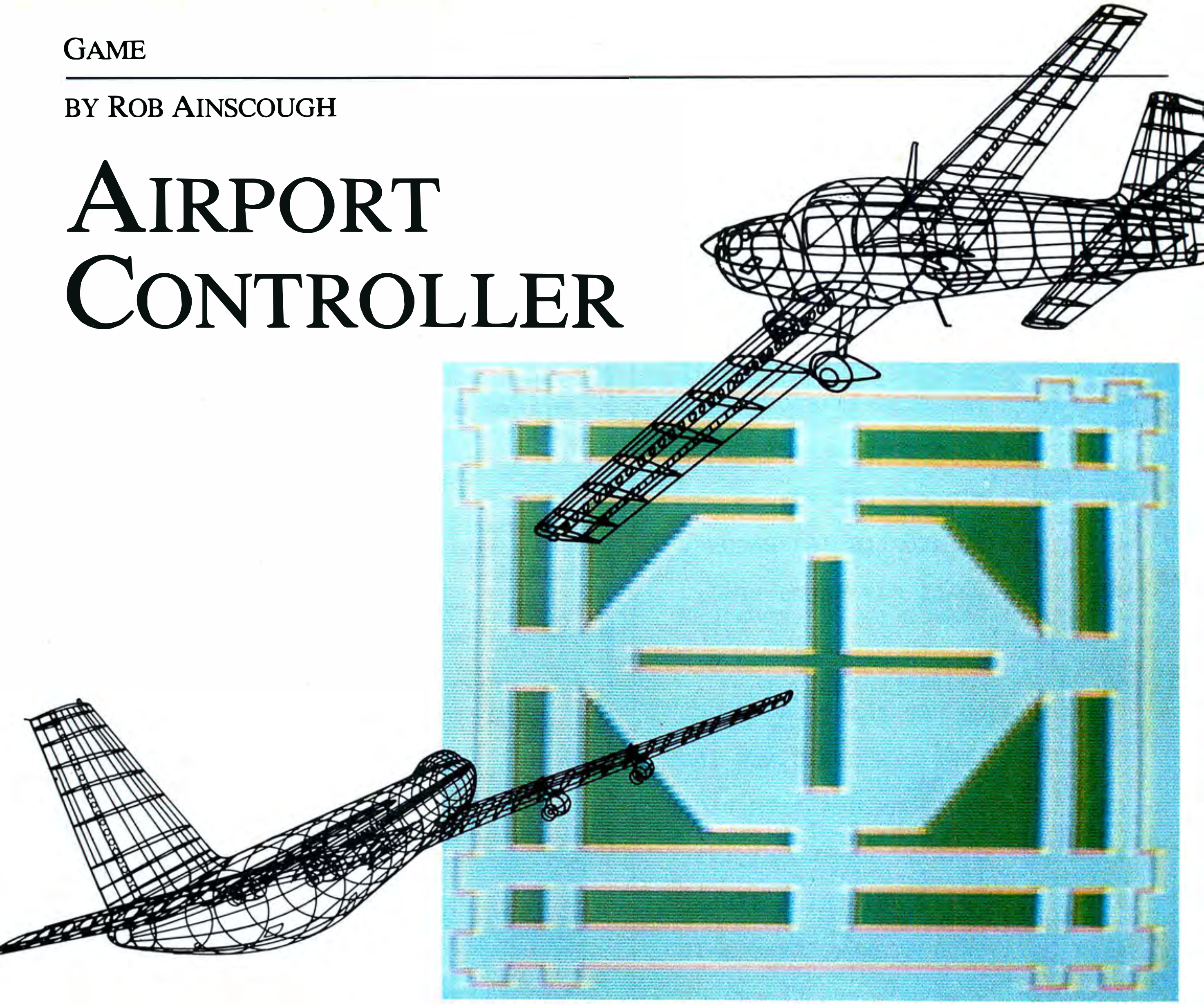
CITY ______ STATE ______ ZIP ______

**START USING YOUR COMPUTER FOR FUN and PROFIT!**

GAME

BY ROB AINSCOUGH

# AIRPORT CONTROLLER



"This is CN6490, control tower."

"This is control tower. We have you on approach on runway 7."

"Check. Do we have clearance?"

"Control tower. Switching to runway view....We have medium-sized 707 K9768 on far end of runway 7."

"Do we have landing distance, tower?"

"Uhh...OK! Clear for landing, CN6490."

"Control tower, we have touch down...Uhh, tower, we have insufficient stopping distance. We are going to crash. Emergency, tower, HELP!"

"...Darn, we lost two planes. Let's try to get the others down."

*System Requirements*

**32K RAM**
**Extended Color Basic**

> "K9768 to control tower. Come in control tower. Request permission to land. Do we have clearance?"

Airport Controller requires quick thinking and efficient execution. This game is not exactly in accordance with the rules of real airport controllers as the above conversation shows. No controller would allow another aircraft to land on an already occupied runway. You can break rules in this game because you have only about 15 minutes to land and dock from 1 to 51 planes. Your job is to land and dock as many as possible.

Airport Controller includes instructions within the program, and is manipulated by keyboard input (INKEY$). You are asked how many planes you want to play. I recommend between 15 and 25, and no more than 52 because of memory limitations and available docking space.

After you enter the number of planes, the program displays the detailed airport and sector maps. The airplanes appear as small blue and green dots. Blue dots are large planes and green dots are medium planes. The computer makes a sound after generating all the planes. Play starts directly following the sound, and you get approximately 14–15 minutes to land and dock your planes. The game always starts out with the sector view (no planes start on the detailed view).

The program run explains the commands for movement and other options, but here are some hints on good play:

- Read the instructions included in the program.

- Don't move into any nonwhite (buff) area.
- Planes can enter the red rectangular landing ports from any of the sides (not just the front).
- Be careful which keys you hit.
- Use the V key only when necessary.
- Don't spend too much time thinking about moves.
- Use the shortest route to the docking area.
- When a plane has landed and it is that plane's turn to move, move one space to the side, and then move towards the docking area. This allows another plane to land on the same runway without a collision. ■

---

*Address correspondence to Rob Ainscough, 708 Cheyenne, Walnut Creek, CA 94595.*

| | |
|---|---|
| A(#,type) | This is the dimensioned array that holds the characteristics of each plane. |
| D | This is the number used in the main program loop (D,type). D represents the plane. |
| A$ | Used with any INKEY$ command that requires keyboard input. |
| DA | Used when presetting previous inputted points for the x coordinate. |
| DB | Used when presetting previous inputted points for the y coordinate. |
| C | A counter in a GOTO loop. Deals with the random number of times each plane can move. Also is the crash counter at the end of the game. |
| M | This is the random number that each plane can move (at least 10). |
| OUT | Given a value when exiting the crash procedure. (One there is a crash, zero there isn't a crash.) |
| NU | This contains the value for the number of planes to be generated. |
| L | This is the counter loop used in reading data for the landing port coordinates. |
| LA | This is the random number of landing space each plane will take to land. |
| M$ & A$ | |
| P$ & S$ | These contain the DRAW commands used in creating the detailed airport view. |
| UD | This is the number of planes that were not docked. |
| D | This is the number of planes that were docked. |
| LN | This is the number of planes that landed. |
| DL | The number of planes that didn't land. |

*Table 1. Variables*

*Program Listing. Airport Controller.*

```
10 PCLEAR4
20 CLEAR 1000
30 CLS:PRINT@109,"WELCOME":PRINT
@175,"TO":PRINT@231,"AIRPORT CON
TROLLER":PRINT@484,"PRESS ANY KE
Y TO CONTINUE"
40 A$=INKEY$:IF A$="" THEN OT=RN
D(128):OT=RND(96):GOTO 40
50 CLS:PRINT@224,"WOULD YOU LIKE
 INSTRUCTIONS(Y/N)";:INPUT A$
60 IF A$="Y" THEN GOSUB 1880
70 CLS:PRINT@228,"ENTER NUMBER O
F PLANES";:INPUT NU
80 IF NU>52 OR NU<0 THEN 70
90 DIM A(NU,4)
100 REM MAP STORED IN STRING VAR
IABLES *************************
110 M$="D1R2U1R2D1R2U1R27D1R2U1R
2D1R2U1R1U2L1U2R1U2L1U18R1U2L1U2
R1U2L1U1L2D1L2U1L2D1L27U1L2D1L2U
1L2D1L1D2R1D2L1D2R1D18L1D2R1D2L1
D2R1BR2BU2"
120 A$="R2U2L2D2BR4R11U2L11D2BU4
R11U1L5H6D7BL2U7L2D7R2BU10U8L2D8
R2BR2E7R4U1L11D8BU10R11U2L11D2BL
2U2L2D2R2"
130 P$="BR17R12U2L12D2BD2R12D8H7
L5U1BR14R2D8L2U8BU2R2U2L2D2BD13R
2D7L2U7BL2D7L12U1R6E6BD9L12D2R12
U2BR2R2D2L2U2"
140 S$="BU10BL5U1L10U6L2D6L9D1R9
D5R2U5R10"
150 REM GENERATES AIRPORT MAP **
********************************
160 PMODE 1,1:PCLS:SCREEN 1,1
170 PCLS2
180 DRAW "S24BM10,186;"+M$+A$
190 DRAW P$+S$
200 PAINT(96,116),1,4:PAINT(255,
100),1,4:PAINT(0,100),1,4:PAINT(
128,191),1,4:PAINT(128,0),1,4:PA
INT(228,0),1,4:PAINT(228,191),1,
4:PAINT(28,0),1,4:PAINT(28,191),
1,4
210 REM GENERATES SECTOR MAP ***
*******************************
220 PMODE1,3:PCLS:SCREEN 1,1
230 COLOR7,5
240 LINE(98,68)-(158,124),PSET,B
250 COLOR8,5
260 LINE(98,124)-(106,132),PSET,
BF:LINE(150,124)-(158,132),PSET,
BF:LINE(150,60)-(158,68),PSET,BF
:LINE(98,60)-(106,68),PSET,BF:LI
NE(88,68)-(98,76),PSET,BF:LINE(8
8,116)-(98,124),PSET,BF:LINE(158
,68)-(168,76),PSET,BF:LINE(158,1
16)-(168,124),PSET,BF
270 LINE(102,60)-(102,68),PRESET
:LINE(158,72)-(168,72),PRESET:LI
NE(88,120)-(98,120),PRESET:LINE(
88,72)-(98,72),PRESET:LINE(158,1
20)-(168,120),PRESET:LINE(102,12
4)-(102,132),PRESET:LINE(154,60)
-(154,68),PRESET:LINE(154,124)-(
154,132),PRESET
280 REM GENERATING PLANES ******
*******************************
290 FOR D=1 TO NU
300 X=(RND(128)-1)*2:Y=(RND(96)-
```

Listing continued

*Listing continued*

```
1)*2
310 T=RND(2)+1
320 GOSUB 400
330 IF ST=1 THEN ST=0:GOTO 300
340 IF ((X>=86 AND X<=170) AND (
Y>=58 AND Y<=134)) OR (X<=24 OR
X>=230 OR Y<=20 OR Y>=176) THEN
300
350 A(D,0)=X:A(D,1)=Y:A(D,2)=T:A
(D,3)=0
360 PSET (A(D,0),A(D,1),A(D,2))
370 NEXT D
380 SOUND 200,4
390 GOTO 460
400 REM CHECK TO MAKE SURE PLANE
S DON'T APPEAR TWICE **********
410 FOR B=1 TO D-1
420 IF ST=1 THEN 440
430 IF A(B,0)=X AND A(B,1)=Y THE
N ST=1
440 NEXT B
450 RETURN
460 TIMER=0
470 REM LOOP FOR MAIN PROGRAM RU
N ****************************
480 FOR D=1 TO NU
490 C=0:A$=INKEY$
500 IF TIMER>=50000 THEN GOTO 15
30
510 IF A(D,4)=2 OR A(D,4)=1 THEN
 530
520 IF A(D,3)=1 THEN GOSUB 550 E
LSE GOSUB 750
530 NEXT D
540 GOTO 470
550 REM DETAIL SCREEN MOVEMENT *
*******************************
560 PMODE 1,1:SCREEN 1,1
570 M=RND(5)+9
580 C=C+1:IF C=M+1 THEN C=0:GOTO
 730
585 DB=0:DA=0
590 IF TIMER>=50000 THEN GOTO 15
30
600 PSET(A(D,0),A(D,1),A(D,2)):A
$=INKEY$:IF A$="" THEN PRESET(A(
D,0),A(D,1)):OT=RND(5):GOTO 600
610 PRESET (A(D,0),A(D,1))
620 IF A$=CHR$(94) THEN A(D,1)=A
(D,1)-2:DB=+2
630 IF A$=CHR$(10) THEN A(D,1)=A
(D,1)+2:DB=-2
640 IF A$=CHR$(8) THEN A(D,0)=A(
D,0)-2:DA=+2
650 IF A$=CHR$(9) THEN A(D,0)=A(
D,0)+2:DA=-2
660 IF A$="D" THEN GOTO 990
670 IF A$="S" THEN PSET(A(D,0),A
(D,1),A(D,2)):RETURN
680 GOSUB 1260
690 IF OUT=1 THEN OUT=0:RETURN
700 PSET(A(D,0),A(D,1),A(D,2)):P
RESET(A(D,0)+DA,A(D,1)+DB)
710 DA=0:DB=0
```

```
720 GOTO 580
730 SOUND 150,5
740 RETURN
750 REM SECTOR SCREEN MOVEMENT *
*******************************
760 PMODE 1,3:SCREEN 1,1
770 M=RND(5)+9
780 C=C+1:IF C=M+1 THEN C=0:GOTO
 970
790 IF TIMER>=50000 THEN GOTO 15
30
800 DA=0:DB=0
810 PSET(A(D,0),A(D,1),A(D,2)):A
$=INKEY$:IF A$="" THEN OT=RND(5)
:PRESET(A(D,0),A(D,1)):GOTO 810
820 IF A$=CHR$(94) THEN A(D,1)=A
(D,1)-2:DB=+2
830 IF A$=CHR$(10) THEN A(D,1)=A
(D,1)+2:DB=-2
840 IF A$=CHR$(8) THEN A(D,0)=A(
D,0)-2:DA=+2
850 IF A$=CHR$(9) THEN A(D,0)=A(
D,0)+2:DA=-2
860 IF A$="V" THEN GOTO 1480
870 IF A(D,0)>255 THEN A(D,0)=25
5
880 IF A(D,0)<0 THEN A(D,0)=0
890 IF A(D,1)>191 THEN A(D,1)=19
1
900 IF A(D,1)<0 THEN A(D,1)=0
910 IF PPOINT(A(D,0),A(D,1))=8 T
HEN GOTO 1030
920 GOSUB 1260
930 IF OUT=1 THEN OUT=0:RETURN
940 PSET(A(D,0),A(D,1),A(D,2)):P
RESET(A(D,0)+DA,A(D,1)+DB)
950 RESTORE
960 GOTO 780
970 SOUND 150,4
980 RETURN
990 REM CHECK DOCKING *********
*******************************
1000 PSET(A(D,0),A(D,1),A(D,2))
1010 IF (A(D,0)>=62 AND A(D,0)<=
192 AND A(D,1)>=92 AND A(D,1)<=1
06) OR (A(D,0)>=114 AND A(D,0)<=
134 AND A(D,1)>=58 AND A(D,1)<=1
34) THEN A(D,4)=1:C=0:DA=0:DB=0:
PLAY"T6O2V10ABCP25V25DEFGP20O1AO
2AO3AO4AO5A":GOTO 2190
1020 GOTO 710
1030 REM LANDING PLANE *********
********************************
1040 L=L+1:IF L=17 THEN L=0:GOTO
 920
1050 READ S,T,Q,R,V,K
1060 IF A(D,0)>=S AND A(D,0)<=T
AND A(D,1)>=Q AND A(D,1)<=R THEN
 PRESET(A(D,0)+DA,A(D,1)+DB):A(D
,0)=V:A(D,1)=K:A(D,3)=1:GOTO 108
0
1070 GOTO 1040
1080 PMODE 1,1:SCREEN 1,1
1090 L=0
```

*Listing continued*

*Listing continued*

```
1100 LA=INT((RND(30)+48)*A(D,2)/
2)
1110 IF A(D,1)=6 THEN NY=+2:NX=0
:DB=-2:DA=0
1120 IF A(D,1)=184 THEN NY=-2:NX
=0:DB=+2:DA=0
1130 IF A(D,0)=10 THEN NX=+2:NY=
0:DA=-2:DB=0
1140 IF A(D,0)=244 THEN NX=-2:NY
=0:DA=+2:DB=0
1150 FOR FF=1 TO LA
1160 GOSUB 1260
1170 IF OUT=0 THEN PSET(A(D,0),A
(D,1),A(D,2))
1180 A(D,0)=A(D,0)+NX:A(D,1)=A(D
,1)+NY
1190 IF OUT=1 THEN OUT=0:RETURN
1200 PRESET(A(D,0)+DA,A(D,1)+DB)
1210 NEXT FF
1220 PSET(A(D,0),A(D,1),A(D,2))
1230 SOUND 150,5
1240 C=0:L=0:RESTORE
1250 RETURN
1260 REM CHECKING FOR A CRASH **
********************************
1270 RESTORE
1280 IF PPOINT(A(D,0),A(D,1))<>5
 THEN OUT=1:C=0:L=0:GOSUB 1300
1290 RETURN
1300 REM DEALING WITH A PLANE CR
ASH ***************************
1310 PLAY"T75O2ABCDEFGABCDEFGABC
DEFGABCDEFG"
1320 IF PPOINT(A(D,0),A(D,1))<>8
 THEN PRESET(A(D,0),A(D,1)):PRES
ET(A(D,0)+DA,A(D,1)+DB)
1330 IF PPOINT(A(D,0),A(D,1))=8
THEN PRESET (A(D,0)+DA,A(D,1)+DB
)
1340 A(D,4)=2:GOSUB 1360
1350 RETURN
1360 REM CHECKING FOR PLANES IN
ONE AREA **********************
1370 FOR B=1 TO NU
1380 IF A(D,3)=1 THEN GOTO 1390
ELSE GOTO 1430
1390 IF A(B,3)<>1 THEN 1460
1400 IF B=D THEN 1460
1410 IF A(D,0)=A(B,0) AND A(D,1)
=A(B,1) THEN A(B,4)=2
1420 GOTO 1460
1430 IF A(B,3)<>0 THEN 1460
1440 IF B=D THEN 1460
1450 IF A(D,0)=A(B,0) AND A(D,1)
=A(B,1) THEN A(B,4)=2
1460 NEXT B
1470 RETURN
1480 REM CHANGING THE VIEWS ****
```

*Listing continued*

MUL-T-SCREEN

COLOR CHARACTER GENERATOR

HAS ALL STANDARD FEATURES

- Total of 10 character sizes, from 8*4 to 42*24.
- Mix text & graphics in any PMODE.
- Mix up to 5 character sizes in 4 colors on one screen.
- Recognizes all commands & keys.
- Full underline in all PMODES.
- Recognizes CLS, PRINTTAB, PRINT@, as well as its own cursor controls.
- Includes 2 sample BASIC programs.

INCENTIVE SOFTWARE ✓91
P.O. BOX 7281
Port Huron MI 48301 U.S.A.
or
P.O. BOX 323 Station-B
London Ont. Canada N6A 4W1
(519) 681-0133

RAINBOW CERTIFICATION SEAL

HAS MANY MORE FEATURES THAN HIGHER PRICED PROGRAMS

- Prints vertically.
- Pos. & neg. screen dumps in 2 sizes.
- 4 defineable limited text screens can limit the text anywhere from a single character to the entire screen.
- Regular and graphic scroll types.
- Horizontally scrolling one line screens. Up to 4 can be used at the same time.
- Special trace delay for debugging.
- Printer control outputs characters to screen & printer simultaneously.

MIN. 16K (EXT. BASIC NOT REQUIRED)
TAPE - 24.95 US or 29.95 CDN
DISK - 27.95 US or 32.95 CDN
7% SALES TAX - ONTARIO ONLY
OUTSIDE U.S. & CANADA ADD $2

*Listing continued*

```
********************************
1490 PMODE 1,1:SCREEN 1,1
1500 A$=INKEY$:IF A$="" THEN OT=
RND(30):GOTO 1500
1510 PMODE 1,3:SCREEN 1,1
1520 GOTO 810
1530 REM END OF GAME ***********
*****************************
1540 SCREEN 0,0:CLS
1550 PRINT@233, "END OF GAME"
1560 UD=0:D=0:C=0
1570 FOR Z=1 TO NU
1580 IF A(Z,4)=0 THEN UD=UD+1
1590 IF A(Z,4)=1 THEN D=D+1
1600 IF A(Z,4)=2 THEN C=C+1
1610 IF A(Z,3)=1 THEN LN=LN+1
1615 IF A(Z,3)=0 THEN DL=DL+1
1620 NEXT Z
1630 FOR DE=1 TO 700:NEXT DE
1640 CLS:PRINT:PRINT:PRINT
1650 PRINT"# THAT WERE NOT DOCKE
D"UD
1660 PRINT"# THAT WERE DOCKED"D
1670 PRINT"# THAT HAD CRASHED"C
1680 PRINT "# THAT HAD LANDED"LN
1685 PRINT"# THAT HADN'T LANDED"
DL
1690 PRINT:INPUT"WOULD YOU LIKE
TO TRY ANOTHER TIME (Y/N)";I$
1700 IF I$="Y" THEN CLEAR0:GOTO
20
1710 END
1720 DATA 88,98,68,70,10,12
1730 DATA 88,98,74,76,10,36
1740 DATA 88,98,116,118,10,156
1750 DATA 88,98,122,124,10,180
1760 DATA 98,100,124,132,14,184
1770 DATA 104,106,124,132,38,184
1780 DATA 150,152,124,132,214,18
4
1790 DATA 156,158,124,132,238,18
4
1800 DATA 158,168,122,124,244,18
0
1810 DATA 158,168,116,118,244,15
6
1820 DATA 158,168,74,76,244,36
1830 DATA 158,168,68,70,244,12
1840 DATA 156,158,60,68,238,6
1850 DATA 150,152,60,68,214,6
1860 DATA 104,106,60,68,38,6
1870 DATA 98,100,60,68,14,6
1880 REM INSTRUCTIONS **********
******************************
1890 CLS:PRINT
1900 PRINT"THIS IS THE GAME OF A
IPORT CONTROLLER. YOU ARE THE SI
NGLE TOWER CONTROLLER OF AN AIRP
ORT. YOU HAVE TO LAND AND DOCK A
N INPUTED NUMBER OF PLANES WITHI
N 15 MINUTES."
1910 PRINT"ALL AIRPORT RULES CAN
 BE BROKEN EXCEPT CRASHING INTO
OTHER PLANES AND/OR AIRPORT BOUN
DARIES. THE PLANES COME IN TWO S
IZES AND COLORS. BLUE DOTS REPRE
SENT LARGE PLANES, AND THE GREEN
 DOTS REPPRESENT MEDIUM PLANES."
1920 PRINT"press any key to cont
inue"
1930 A$=INKEY$:IF A$="" THEN GOT
O 1930
1940 CLS:PRINT:PRINT"THE BLUE PL
ANES NEED MORE RUNWAY SPACE THAN
 THE GREEN PLANES. I RECOMMEND T
HAT BLUE PLANES LAND ON HORIZONT
AL RUNWAYS. GREEN PLANES CAN LAN
D ON ANY RUNWAY. THERE ARE TWO V
IEWS (SCREENS) IN THIS GAME."
1950 PRINT"THE SECTOR VIEW DISPL
AYS A BLUE SQUARE WITH COLORED I
N RED BLOCKS PROTRUDING FROM THE
 CORNERS. THIS IS A SMALL, LESS
DETAILED VIEW OF THE AIRPORT. TH
E RED RECTANGLES ARE THE LANDING
 PORTS."
1960 PRINT"press any key to cont
inue"
1970 A$=INKEY$:IF A$="" THEN GOT
O 1970
1980 CLS:PRINT:PRINT"YOU HAVE TO
 ENTER THESE LANDING PORTS WITH
THE PLANES. ONCE THIS IS DONE; A
 DETAILED VIEW OF THE AIRPORT WI
LL APPEAR. DEPENDING ON WHICH LA
NDING PORT YOU ENTERED THE PLANE
 WILL LAND ON THE CORRESPONDING
RUNWAY."
1990 PRINT"YOU SHOULD SEE A DOT
(PLANE) MOVING DOWN THE RUNWAY.
IT WILL EVENTUALLY COME TO A STO
P (ASSUMING IT DOESN'T CRASH). N
OW IT IS THE NEXT PLANES TURN, A
ND THE PROCEDURE STARTS OVER. HO
W DO YOU KNOW WHICH PLANE IS TO
MOVE NEXT?"
2000 PRINT"press any key to cont
inue"
2010 A$=INKEY$:IF A$="" THEN GOT
O 2010
2020 CLS:PRINT:PRINT"SIMPLY LOOK
 FOR THE PLANE WHICH IS RAPIDLY
FLASHING. YOU WILL ONLY BE ALLOW
ED TO MOVE YOUR PLANE A CERTAIN
NUMBER OF PLACES. AT THE END OF
YOUR LAST MOVE OF EACH PLANE, TH
E COMPUTER WILL MAKE A SOUND."
2030 PRINT"NOW LOOK FOR ANOTHER
FLASHING PLANE AND CONTINUE THE
PROCESS. IF YOUR NEXT PLANE HAS
LANDED THEN A DETAILED VIEW OF T
HE AIRPORT WILL APPEAR. YOUR PLA
NE WILL BE FLASHING; PROCEED TO
MOVE IT TOWARDS THE DOCKING AREA
."
2040 PRINT"press any key to cont
inue"
2050 A$=INKEY$:IF A$="" THEN GOT
```

*Listing continued*

*Listing continued*

```
O 2050
2060 CLS:PRINT:PRINT"THERE ARE F
IVE KEYS THAT CAN BE PRESSED DUR
ING THE SECTOR VIEW MODE. THESE
ARE LEFT ARROW TO MOVE LEFT, RIG
HT ARROW TO MOVE RIGHT, UP ARROW
 TO MOVE UP, AND DOWN ARROW TO M
OVE DOWN."
2070 PRINT"IN ADDITION, YOU CAN
PRESS THE V KEY AND A DETAILED V
IEW OF THE AIRPORT AND PLANES LA
NDED WILL APPEAR (PRESS ANY KEY
TO RETURN). IF ANY OTHER KEY IS
PRESSED THEN YOUR PLANE WILL CRA
SH INSTANTLY (EXCLUDING V MODE).
"
2080 PRINT"press any key to cont
inue"
2090 A$=INKEY$:IF A$="" THEN GOT
O 2090
2100 CLS:PRINT:PRINT"IN THE DETA
ILED VIEW MODE YOU MAY PRESS SIX
 DIFFERENT KEYS. THEY ARE THE AB
OVE FOUR ARROW KEYS, AND THE D A
ND S KEYS. IF THE D KEY IS PRESS
ED THEN YOU PLANE WILL DOCK IF I
T IS IN THE CORRECT AREA."
2110 PRINT"THE DOCKING AREA IS T
HE PLUS SHAPE BUILDING IN THE CE
NTER OF THE SCREEN. YOU MAY DOCK
 WITHIN TWO SPACES OF THE EIGHT
LONG SIDES. THE S KEY IS SIMPLY
STOPPING THE PLANE FROM MOVING,
AND PLAY WILL RESUME WITH THE NE
XT PLANE"
2120 PRINT"press any key to cont
inue"
2130 A$=INKEY$:IF A$="" THEN GOT
O 2130
2140 CLS:PRINT:PRINT"IF YOU MOVE
 YOUR PLANE INTO ANY NON-CLEAR A
REA YOU WILL CRASH. AFTER THESE
INSTRUCTIONS, YOU WILL BE ASKED
HOW MANY PLANES DO YOU WISH TO S
TART WITH. I RECOMMEND 15-25 AS
A GOOD STARTER, BUT KEEP IT LESS
 THAT 52."
2150 PRINT"AFTER 15 MINUTES IS U
P THEN THE GAME IS OVER, AND A D
ISPLAY WILL SHOW HOW WELL YOU DI
D. GOOD LUCK!!!"
2160 PRINT"press any key to cont
inue"
2170 A$=INKEY$:IF A$="" THEN GOT
O 2170
2180 RETURN
2190 REM CHECK TO SEE IF ALL AIR
CRAFT HAVE DOCKED OR CRASHED **
2200 FOR WE=1 TO NU:IF A(NU,4)=1
 OR A(NU,4)=2 THEN IH=IH+1:NEXT
WE
2210 IF NU=IH THEN IH=0:GOTO 153
0
2220 IH=0:RETURN
```

*END*

STORM TRAX

*Hurricane Analysis System

Gulf Atlantic
Caribbean

32 K Color Computer, Ext. Basic
Cassette or Disk

**Menu Driven**
**All Graphics Mode**
**High Resolution Maps**

*Loads and Stores DATA FILES*
*Produces LISTINGS*
*PLOTS Storm Track, Winds and Pressure*
*COMPUTES TRUE Heading, Speed, and Distance Data*
plus *THREAT FACTORS for 10 Cities*

—TAPE $19.95 DISK $24.95—
1978-83 Storm Data; Tape 3.95, Disk 6.95

Send SASE for More Information ✓426

**LOGIX SYSTEMS Lmtd.**
**P.O. BOX 57012 WEBSTER, TEXAS — 77598**

I HAVE SOMETHING TO SAY!

*For as little as 46 cents* a program you can enjoy great games like **FROGJUMP, FRENZY, CATERPILLAR CAVE, SHOOTIN GALLERY,** and great adventures. Use powerful home management programs such as **BUDGET, STOCK MARKET, BARTENDER, TINY CALC,** and **COST OF LIVING.** Also, enjoy the use of powerful programming utilities such as **COCO MONITOR, GRAPHIC SCREEN PRINT, RAM TEST, HIGH RESOLUTION TEXT,** and **SINGLE DISK COPY.** Increase your knowledge with educational programs such as **BASIC SPEED UP TUTORIAL, FLASH CARD, TRIGONOMETRY TUTOR,** and our **8 PART SERIES ON MACHINE LANGUAGE.**

⁂ Many programs use machine language! ⁂

Every month you will receive a cassette tape with 10 ready to run documented programs.

16K Extended Required

ORDERS SENT SAME DAY!
FIRST CLASS SHIPPING!
Back Issues Available from July, 1982.
Call or write for our free catalog.
Dealer Inquiries Invited.

PRICES
1 YR (12 ISSUES) . $55.00
6 MO (6 ISSUES) . $30.00
SINGLE COPIES . $ 6.00

MICHIGAN RESIDENTS ADD 4% TO ORDER

OVERSEAS ADD $10.00 TO SUBSCRIPTION AND $1.00 TO SINGLE COPIES

PERSONAL CHECKS WELCOMED!

★ ★ ★ ★ FREE PROGRAMS ★ ★ ★ ★
FOR EACH ORDER OF 20 OR MORE TAPES YOU WILL RECEIVE TWO COLOR COMPUTER PROGRAMS OF THE ABOVE PRODUCT!

✓236

T&D

COMPUTER CASSETTES

★ 5 SCREW SHELL
★ FREE LABELS
★ ERROR FREE TAPE
★ IMMEDIATE SHIPPING

MasterCard

T&D Computer Products
P.O. Box 256-C
Holland, MI 49423
(616) 396-7577

VISA

| ITEM | PRICE | QUANT. | TOTAL |
|---|---|---|---|
| C-10 | .59 | | |
| C-20 | .69 | | |
| C-60 | .85 | | |
| C-90 | .99 | | |
| | | | |
| Outside USA Add $3.00 USA funds only | | Subtotal | |
| | | Shipping | 3.00 |
| | | Mich. Res. | 4% |
| | | TOTAL | |

Name ______
Address ______
City ______ St ______ Zip ______
Credit Card ______ Exp ______

✓ See List of Advertisers on page 99

## KEY—264K

- ACCESS YOUR 64K RAM AS TWO 32K BANKS FROM BASIC IT'S LIKE HAVING TWO COMPUTERS IN ONE !!!
- HAVE SEPARATE PROGRAMS IN EACH BANK AND SWITCH INSTANTLY BETWEEN THEM WITH SIMPLE KEYSTROKES
- HAVE ONE LARGE PROGRAM THAT OCCUPIES BOTH BANKS
- RUN TWO PROGRAMS AT THE SAME TIME WITH FOREGROUND/BACKGROUND MULTI-TASKING
- ADDS 16 NEW COMMANDS TO EXTENDED OR DISK BASIC PASS VARIABLES BETWEEN BANKS - CALL SUBROUTINES ACROSS BANKS - VIEW TEXT OR GRAPHICS FROM EITHER BANK - COPY MEMORY ACROSS BANKS, START AND STOP MULTI-TASKING, ALL WITH BASIC COMMANDS
- INCLUDES 8 KEYBOARD COMMANDS TO ALLOW SWITCHING BANKS, MULTI-TASKING, BREAK, RESET, COLD STARTS AND DUPLICATING ONE BANK TO THE OTHER
- WORKS WITH CASSETTE OR DISK BASED SYSTEMS
- WORKS ON ANY 32K OR 64K COCO WITH EXTENDED OR DISK BASIC AND GOOD 64K MEMORY CHIPS

ORDER YOUR KEY-264K TODAY by sending check or money order for $39.95 (Cassette) or $44.95 (Disk) plus $2.00 postage U.S.A. ($5.00 outside U.S.A.) Mass. residents add 5% sales tax. COD (add $3.00), MASTERCARD, or VISA call (617) 263-1737

KEY COLOR SOFTWARE
P.O. BOX 360
HARVARD, MA. 01451

✓48

## THINKING PRINTER?

**GEMINI 10X** . . . . . . . . . **319.95**
120 C.P.S. • Screen Dump Software • Complete System

**GEMINI 15X** . . . . . . . . **439.95**
120 C.P.S. • Screen Dump Software • Complete System

**DELTA 10** . . . . . . . . . . . **539.95**
160 C.P.S. • 8 K Buffer • Complete System

**DELTA 15** . . . . . . . . . . . **649.95**
160 C.P.S. • 8 K Buffer • Complete System

**POWER TYPE** . . . . . . **429.95**
Letter Quality • Complete System

**COMPLETE SYSTEMS INCLUDE**
• 180 DAY WARRANTY • 300 TO 9600 BAUD INTERFACE FOR COCO
• ALL CABLES/NOTHING MORE TO BUY
ADD $10 SHIPPING IN CONTINENTAL UNITED STATES

## THINKING MODEM?

**COMPLETE DATA COMMUNICATIONS PACKAGE***
**79.95**

| | |
|---|---|
| • **VOLKSMODEM** | 300 BAUD • LIFETIME WARRANTY<br>DIRECT CONNECT • ANS/ORG. |
| • **T.S.P.**<br>**Terminal Software Package** | 51 X 24 HI-RES DISPLAY • BUFFER AUTO ADJUSTS FOR 16K TO 64K • PERMITS COMMUNICATION TO VIRTUALLY ALL BBS AND NETWORKS |
| • **CABLES** | EVERYTHING YOU NEED TO LOG ON<br>NOTHING MORE TO BUY |

*REQUIRES 16 K BASIC + MODULAR PHONE SERVICE • ADD $2 SHIPPING IN CONTINENTAL UNITED STATES

**DAYTON ASSOCIATES, INC.**
7201 CLAIRCREST BLDG. C • DAYTON, OHIO 45424
(513) 236-1454
OHIO RESIDENTS ADD 6% SALES TAX

✓73

IN ASSEMBLY LANGUAGE CAT# DM901 $19.95 (CAN) $16.95 (US)

This new book on CoCo assembly language is supplied with a tape of all the programs inside. Chapters on Reading The Keyboard, File I/O, Reading the Joysticks, Producing Sound, Using High Resolution plus many more are included. For the more advanced student there is also an extensive chapter on threaded code. Mr. Landwehr has a bachelor's degree in computer science and may be familiar to many of you from his articles in computer magazines.

SCREEN CAT# DM015 16K $12.95 (CAN) $10.95 (US)

Four much needed features are added to Basic with this new machine language utility program from Australia.

1. Automatic line numbering
2. Line by line program listing
3. Motor on/off from the keyboard.
4. Your choice of light or dark, orange, green or black screen with light or dark orange or green characters.

Works with Basic, Ext Basic & Disk Basic

SUPER EDIT CAT# DM016 16k $19.95 (CAN) $16.95 (US)

This powerful new utility program from the author of "In Assembly Language" adds many new editing commands to Basic. You can PRINT one screenful at a time, DELETE a line or lines, JOIN several lines together and hide your programs, or FIND strings and variables. Also included are commands to INSERT, COPY, MOVE & REPLACE one line or a block of lines. Super edit works with Extended Basic but Extended Basic is not required.

ADD 3% SHIPPING & HANDLING PER ORDER-MINIMUM $2.50

WE ARE THE CANADIAN DISTRIBUTORS FOR THE FOLLOWING FINE COMPANIES:-

*ADVENTURE INTERNATIONAL *ARCADE ANIMATION, INC* *AMDEK *ARK ROYAL GAMES *BUMBLEBEE SOFTWARE* *BYTE BOOKS *COLORQUEST *COMPUTER SYSTEMS CENTER* *COMPUTERWARE *DATASOFT *DRAGON COMPUTERS* *DSL COMPUTER PRODUCTS *ELITE SOFTWARE *ENDICOTT* *FACIT PRINTERS *FOLLETT LIBRARY BOOK COMPANY* *FRANK HOGG LABORATORY *HAYES BOOKS *HOMBASE* *INTRACOLOR *J & M SYSTEMS *MARK DATA PRODUCTS* *MED SYSTEMS *MICRO WORKS *OSBORNE BOOKS* *PRENTICE-HALL *PRICKLY PEAR *PRISM SOFTWARE* *RAINBOW CONNECTION SOFTWARE *REAL SOFTWARE* *SOFTLAW CORPORATION *SPECTRAL ASSOCIATES* *SPEECH SYSTEMS *SUGAR SOFTWARE *SYBEX BOOKS* *T. C. E. *PROGRAMMERS GUILD *TOM MIX SOFTWARE* *TRANSFORMATION TECHNOLOGIES *WEST BAY COMPANY* *WASHINGTON COMPUTER SERVICES *ZENITH*

THE DATAMAN

420 FERGUSON AVE. N.
HAMILTON, ONTARIO
CANADA L8L 4Y9
PHONE 416-529-1319

**DEALER INQUIRIES WELCOME**

**SEND $3 FOR OUR NEW 80+ PAGE CATALOGUE**

TRS-80+ MOD I, III, COCO, TI99/4a
TIMEX 1000, OSBORNE, others

## GOLD PLUG - 80

Eliminate disk reboots and data loss due to oxidized contacts at the card edge connectors. **GOLD PLUG 80** solders to the board edge connector. Use your existing cables. (if gold plated)

Gold Plug-80 817-498-4242
Ground tab extension

| | |
|---|---|
| **COCO** Disk Module (2) | $16.95 |
| Ground tab extensions | INCL |
| Disk Drives (all R.S.) | $7.95 |
| Gold Disk Cable 2 Drive | 29.95 |
| Four Drive Cable | 39.95 |

new
SPECIAL PRICE

USA shipping $1.45 Can/Mex $4.
Foreign $7. **Don't wait any longer** TEXAS 5% TAX

Available at your favorite dealer or order direct from

**E.A.P. CO.**
P.O. BOX 14
KELLER, TEXAS 76248
(817) 498-4242 MC/VISA

+ trademark Tandy Corp

✓216

TRS-80 extended color basic
Trs-80 as a Controller

# Subroutines To Go

Help yourself to *Machine-Language Subroutines for the Color Computer*. It's a library of useful ready-to-use machine-language routines. Each subroutine is on the cassette that is included in the package. Many of the routines can be used in BASIC as well as machine-language programs. You'll find ROM subroutines, which are located in the interpreter ROMs of the Color Computer, and RAM subroutines, a collection of routines written by David McLeod.

## What's inside

Each chapter contains a specific category of routine, giving a six-letter filename for each routine, a brief description of the routine and what it does, entry and exit requirements and a program listing or sample call. You'll learn about Color BASIC 1.1, Extended BASIC 1.0, Disk BASIC 1.0, numeric conversions, data processing routines, keyboard input routines, text output using high-resolution graphics, tape/disk input/output and multiple precision routines.

## Easy to use

*Machine-Language Subroutines for the Color Computer* is packaged for ease of use while you are working at the computer. Each major section is marked with an index tab. Appendixes and an index of subroutines are included. If you are a machine-language programmer, you'll find *Machine-Language Subroutines for the Color Computer* a valuable addition to your program library.

*Machine-Language Subroutines for the Color Computer*
David D. McLeod ISBN 0-88006-070-0 CC7404 8½ × 11
$29.95 cassette included

## To order

To order, call toll-free *1-800-258-5473* for credit card orders. Or mail your order with check or money order or complete credit card information to: *Wayne Green Books, Retail Sales, Peterborough, NH 03458*. Please include $3.00 per book for shipping and handling. WGBooks are also available at your local bookstore. Dealer inquiries invited. Available May 1984. Please allow 4-6 weeks for delivery. Orders are payable in U.S. dollars only.

✓331

☐ **Yes . . . Send me** ________ copies of *Machine-Language Subroutines for the Color Computer* (CC7404) at $29.95 each, plus $3.00 per book for shipping and handling.

☐ payment enclosed ☐ MasterCard ☐ Visa ☐ Am. Ex.

Card # MC bank #

Expiration date Signature

Name

Address

City State Zip

*Wayne Green Books, Peterborough, NH 03458*

346B4M

# ANNOUNCING
## the premiere of
# jr®

Learning to use your *IBM PCjr* becomes easy and fun with **jr** magazine. Because **jr** keeps things simple, the whole family will *learn and understand while they enjoy themselves.*

**jr** will explain how the *PCjr* works and guide you step-by-step in setting up your system. Most of all **jr** will answer your most important questions month after month . . . like

- **What can I use my *PCjr* for? jr** magazine will teach you how to prepare household budgets, balance your checkbooks, do your taxes and organize schedules and lists.
- **What about the kids?** From kindergarten to college, **jr** helps the kids with educational programs in every subject area.
- **Are there more serious uses for *PCjr*?** Yes! You'll improve your own business skills by learning about word processing, spreadsheets and graphics.
- **What about having fun with *PCjr*?** Relax and enjoy all the latest games with your whole family.

*Plus:*

- **What programs should I choose for the *PCjr*?** **jr** magazine will tell you what programs on the market will run on the *PCjr*, and which ones won't. Plus what new programs are on the way. **jr** will evaluate them *before* you buy.

Order your subscription to **jr** today and you'll get the special charter subscription rate of $14.97. That's 25% off the basic subscription rate! Plus, with your pre-payment of check, American Express, Visa or Mastercard we'll send you a FREE issue making a total of 13 issues for $14.97.

Take advantage of this incredible charter subscription offer. Mail the attached card, the coupon or call TOLL FREE 1-800-258-5473. In New Hampshire call 1-924-9471 . . . TODAY!

Sign me up as a charter subscriber to **jr.** I understand that with prepayment of check or credit card I'll receive a FREE issue making a total of 13 issues for $14.97. Save $5.00 off the basic rate!

☐ CHECK/MO ☐ MC ☐ AE ☐ VISA ☐ BILL ME

Card # ______________________ Exp. Date ________

Signature ______________________

Name ______________________

Address ______________________

City ______________ State ______ Zip ________

Canada & Mexico $17.97, 1 year only, US funds drawn on US bank.
Foreign Surface $34.97, 1 year only, US funds drawn on US bank.
Foreign airmail, please inquire. Please allow 6-8 weeks for delivery. **346F4**

**jr.® For IBM's Home Computer**
**Box 903 Farmingdale, NY 11737**

BY PHILIP MCLAUGHLIN

# ARE THE STARS RANDOM?—PART II

Use small computers to solve mainframe-sized problems. Continue theory study with this tutorial.

Last month, in Part I of this article, you explored lattice structures and Monte Carlo methods as they are used in the Basic program, Stars. I continue to look at these methods in terms of using small computers for big problems, and the sort of mathematics and program structures most suitable.

Lattice-type programs are good for simulating miniature universes that you can study on the monitor screen. You will also find some suggested experiments and modifications to Stars that test the behavior or dynamics of these hypothetical worlds. Before these considerations, however, you must look at the following.

### Sources of Error

Higher-level languages such as Basic usually include floating-point arithmetic routines indispensable for day-to-day use of the computer, or quick, rough calculation. Unless, however, they include some provision for indefinitely increasing the precision (significant figures), they are useless for many scientific purposes.

Arithmetic routines have properties similar to the dynamic range and signal-to-noise ratio of amplifiers. The true dynamic range of an algorithm is restricted by the number of bits available to represent numbers.

Floating-point routines use exponential notation to artificially enhance the range between the largest and the smallest number that can be represented. There is a consequent degradation of numerical accuracy or signal-to-noise ratio, and such routines cannot handle a repeating fraction such as ⅓ without loss.

Since the numerical methods of classical physics use the floating-point routines, data is leaking by the second.

Many problems require fine numeric distinction. For example, if you are comparing the General Theory of Relativity with competing theories, you look for answers beyond the 13th decimal place. Errors accumulate quickly.

Color Basic's floating-point arithmetic is limited to nine digits. You can sometimes use limited-precision arithmetic for finely discriminated results by using the numbers as ratios rather than values since errors tend to cancel out in the long run. If you repeat a calculation with different or covarient parameters, the average result approaches the true value—you hope.

The key phrase here is "long run." It is difficult to establish how often you have to repeat the calculations for accurate results. The best way to solve the difficulties posed by floating-point operations is to avoid them by using only whole numbers.

Integer arithmetic is easy to implement in machine language while the math of "real" numbers can be very difficult. Machine-language routines can produce calculating time economies of at least an order of magnitude.

### Transcendental Functions

Text-book definitions of trigonometric and similar functions involve successive approximation by an infinite series of operations. Over most of the domain of these functions, the exact values are expressed by endless strings of digits.

Computing transcendental functions by truncated infinite series involves a lot of costly floating-point arithmetic. It is much quicker to approximate the values by some combination of table look-up and interpolation, or coordinate rotation techniques. You have to compromise between speed, accuracy, and available memory.

Color Basic does include the standard transcendental functions, but they are of limited accuracy. Serious users needing transcendentals can add fast machine-language subroutines based on CORDIC (coordinate rotation) techniques.

The prejudicing routine in the Stars program uses Color Basic's sine and cosine functions for polar-to-Cartesian conversion. Because of undefined values, the plotted points drift over a period of several hours.

It is argued that lines forming triangles or other shapes in the real world are not infinitely divisible because they are really arrangements of discrete particles or space quanta, which are countable at least in theory. New geometries have been proposed that would apply to universes having finite numbers of points.

There is a unique geometry of this sort associated with each prime number, leading people to speculate that the total number of particles in the universe, large as it may be, must be prime.

If you must get the value of a trigonometric function in an analysis, it might indicate that you don't need accuracy on the quantum level, or that you don't completely understand the problem.

The presence of transcendentals in the Stars radial routine is not really necessary. You can achieve similar effects by integer manipulation orthogonal to the lattice.

### Randomness

Even if you eliminate rounding errors and the effects of truncating infinite series, the application of Monte Carlo methods to integer-unit lattice structures still contains a potentially damaging source of inaccuracy in the random number sequences being fed to the program. In gambler's terms, is the wheel honest?

Unfortunately, there is no pat way to answer this. The concept of randomness seems to be one of those peculiar notions that can be defined only in terms of what it is not.

A random sequence is one that cannot be specified by any description or algorithm shorter than itself.

I refer to this as the first definition of randomness. However, a series that seems to fit this definition doesn't always meet the distribution characteristics needed for Monte Carlo experiments. There must be roughly as many values above as below the median of the series range, about three times as many below as above the three-quarter point, and so on.

Repetition in the series is a violation of the first definition of randomness. Cyclical elevations and depressions of the values that escape detection because they do not repeat exactly can be just as damaging when the results are processed.

Pseudo-random-number generators are compact algorithms that define long number series, therefore violating the first definition of randomness. This does not, however, mean they are useless. The best of them produce well-distributed sequences that approach randomness as closely as most practical sources.

There are tradeoffs in the design of these routines between distribution quality, freedom from cycles or repetition, and computational speed. Within the limits of its range, the RND function on the Color Computer performs well compared to similar functions available on more expensive computers.

For accuracy, use several different sources of random numbers and keep track of them so you can remove spurious trends during cluster analysis.

There are many techniques available for detecting distribution deviations and cyclical repetition of various sorts. There is no test, however, that can absolutely certify the randomness of a series.

### Uncertainty

Imagine a universe in the form of a gigantic Life-type, three-dimensional lattice. Assume the grid is infinite. A cell in the lattice can be either on or off, indicating the presence or absence of an elementary particle.

Remember that in Conway's version of Life, the fate of a cell in the succeeding generation is determined by its immediate neighbors. Imagine here that the fate of each cell is strictly determined by the current state of all the other cells in the universe. This is a free adaption of what used to be known as Mach's Principle.

The rules that determine the fate of cells or particles in such a lattice are not the object of concern here, but such a universe is strictly deterministic.

Any initial configuration of elementary particles predestines all future configurations for all time. No detail of such a universe could be isolated or unimportant.

But such a universe seems deterministic only because you are thinking of it from the perspective of supernatural beings outside the interactions of the lat-

SATURN Electronics Company Inc.

# THE INTRONICS EPROM PROGRAMMER

*Price: $140.*

## *Newly Designed Unit*
## NEW VERSION 2.4

- ☐ Plugs into ROM pack port.
- ☐ Now programs 8K X 8 EPROM *in 15 Seconds.*
- ☐ On board firmware included.
- ☐ No personality modules required.
- ☐ Will program most EPROM's.
- ☐ High quality zero insertion force EPROM socket.

**Enclosed in Molded Plastic Case**

---

SATURN Electronics Company Inc.

## SPLC-1 Lower Case

FOR THE COLOR COMPUTER & TDP-100

*FULLY ASSEMBLED, TESTED & GUARANTEED FOR 90 DAYS*

**$59.95**

☐ TRUE LOWER CASE CHARACTERS ☐ NO CUTTING OR SOLDERING ☐ FULLY COMPATIBLE WITH ALL TRS-80C (SPECIFY REVISION BOARD) [NOT COMPATIBLE WITH COCO 2] ☐ INVERTED VIDEO AT A FLIP OF A SWITCH

---

YOUR SOURCE FOR THE

## COLOR COMPUTER

| | |
|---|---|
| *DRIVE 0 FOR COCO | $329 |
| *DRIVE 1 FOR COCO | $229 |

**GUARANTEED FOR ONE FULL YEAR*

| | |
|---|---|
| • DISK CONTROLLER FOR COCO | $139 |
| • SATURN RS-232 PORT EXPANDER | $ 30 |
| • POWER-ON L.E.D. KIT | $ 6 |
| • FRONT RESET SWITCH KIT | $ 7 |
| • LIBRARY CASE *HOLDS 70 DISKS* | $ 23 |
| • NEW MULTI-COLOR RAINBOW DISKS | $ 25 |
| • ELEPHANT DISKS SSDD | $ 23 |
| • 8 PRIME 64K RAM-CHIPS | $ 50 |
| • GEMINI 10X PRINTER | $299 |
| • HAYES SMART MODEM 300 | $199 |
| *F-A-S-T- UPGRADE SERVICES* | *$CALL!* |

## NEW SOFTWARE

## OS·9BBS ............ $89.95

☐ MULTI-USER CAPACITY ☐ FASTER THAN MOST BBS's ☐ MULTI-TASKING (NO LONGER COMPLETELY TIES UP YOUR COCO) ☐ REQUIRES OS-9 AND BASIC 09

## OS·9* 40-Track Program ............ $24.95

☐ NOW OPERATE 35/40/80 DOUBLE SIDE, DOUBLE DENSITY DRIVES UNDER OS-9

## 64K Terminal Package ............ $24.95

☐ AFFORDABLE ☐ REQUIRES 64K MEMORY ☐ GIVES YOU 52-58K BUFFER ☐ WRITES TO DISC ☐ READS IN FROM DISC ☐ STANDARD DISPLAY

MasterCard VISA

SATURN Electronics Company Inc.

✓447

(Dealer Inquiries Invited)
- MINIMUM $2.00 SHIPPING & HANDLING.
- NYS RESIDENTS ADD SALES TAX.
- ALL OTHER ORDERS ADD 4% SHIPPING.

* OS-9 Trademark of Microware, Inc.

62 COMMERCE DRIVE
FARMINGDALE, NY 11735
(516) 249-3388

# WANTED!

Young men and women seeking adventure, excitement and thrill-a-minute action. No experience necessary—just you and your Color Computer. See below:

## FOR THE 32K THRILLSEEKER

| | | |
|---|---|---|
| ZAXXON, Disk or Cass. | DataSoft | $29.95 |
| PROTECTOR II, Cass. | Synapse | $29.95 |
| DESERT PATROL, Cass. | Arcade Anim. | $21.95 |
| ICEMASTER, Cass. | Arcade Anim. | $21.95 |
| FOODWAR, Cass. | Arcade Anim. | $22.95 |
| WACKY FOOD, Cass. | Arcade Anim. | $19.95 |
| CASHMAN, Cass. | Comp. Shack | $24.95 |
| CHOPPER STRIKE, Cass. | Comp. Shack | $24.95 |

## LOTS OF PLAY FOR 16K

| | | |
|---|---|---|
| MOONSHUTTLE, Cass. | DataSoft | $26.95 |
| SHAMUS, Cass. | Synapse | $29.95 |
| FROG TREK, Cass. | Oelrich | $14.95 |
| 3-D TIC-TAC-TOE, Cass. | Oelrich | $16.95 |

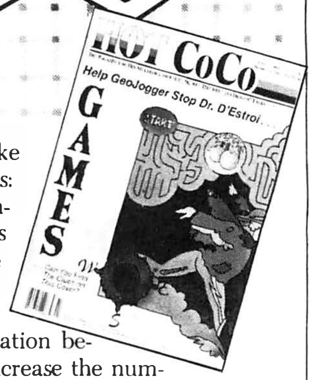
**Interested applicants send check or m/o to:**

**OELRICH PUBLICATIONS**
**4040 N. NASHVILLE**
**CHICAGO, IL 60634**
Credit card orders, call: 800-621-0105
(In Illinois: 312-545-9286)

✓288

---

# Dealers
# Dealers
# Dealers
# SELL!



Selling **HOT CoCo** will make money for you. Consider the facts:

*Fact 1:* Selling **HOT CoCo** increases store traffic—our dealers tell us that **HOT CoCo** is one of the hottest-selling computer magazines on the newsstands.

*Fact 2:* There is a direct correlation between store traffic and sales—increase the number of people coming through your door and you'll increase sales.

*Fact 3:* Fact 1 + Fact 2 = INCREASED SALES, which means more money for you. And that's a fact.

For information on selling **HOT CoCo**, call 800-343-0728 (In N.H. call 924-9471) and speak with Ginnie Boudrieau, our bulk sales manager. Or write to her at **HOT CoCo**, 80 Pine Street, Peterborough, NH 03458.

**HOT CoCo**

**80 Pine Street**
**Peterborough, NH 03458**
**800-343-0728**

---

# PERRY COMPUTERS

## COLOR COMPUTERS

CALL TOLL FREE 1-800-248-3823

### COLOR COMPUTER, DISK DRIVE AND PRINTERS

| | LIST PRICE | OUR PRICE |
|---|---|---|
| 26-3027 16K Color Computer 2 | $ 199.00 | $ 169.00 |
| 26-3127 64K Color Computer 2 | $ 259.00 | $ 220.00 |
| 26-3029 Disk Drive 0 | $ 399.00 | $ 310.00 |
| 26-3023 Disk Drive 1, 2, 3 | $ 279.95 | $ 230.00 |
| 26-1271 DMP-110 | $ 399.00 | $ 310.00 |
| 26-1255 DMP-120 | $ 499.00 | $ 400.00 |
| 26-1254 DMP-200 | $ 699.00 | $ 520.00 |
| 26-1257 DWP-210 | $ 799.00 | $ 630.00 |

### COLOR COMPUTER SOFTWARE

| | OUR PRICE |
|---|---|
| Telewriter 64 Tape | $ 49.95 |
| Telewriter 64 Disk | $ 59.95 |
| VIP Writer | $ 59.95 |
| VIP Speller | $ 49.95 |
| VIP Database | $ 59.95 |
| RADIO SHACK Software | 15% Off |
| TOM MIX Software | $ CALL |
| SPECTRAL ASSOCIATES | $ CALL |

### OTHER PRINTERS AND ACCESSORIES

| | OUR PRICE |
|---|---|
| EPSON Printer | $ CALL |
| OKIDATA Printer | $ CALL |
| STARGEMINI 10X Printer | $ 300.00 |
| TRANSTAR Daisy Wheel Printer | $ 465.00 |
| C.ITOH 8510 Prowriter Printer | $ 380.00 |
| BOTEK Serial to Parallel Interface | $ 59.00 |

### MONITORS

| | OUR PRICE |
|---|---|
| COMREX 12" Monitor | $ 95.00 |
| COMREX 13" Color Monitor | $ 285.00 |
| AMDEK 300A Monitor | $ 155.00 |
| AMDEK Color I Plus | $ 335.00 |
| VIDEO PLUS Monitor Adaptor | $ CALL |
| GORILLA Monitor | $ 85.00 |

### COLOR ACCESSORIES

| | LIST PRICE | OUR PRICE |
|---|---|---|
| 26-2226 RS-232 Program Pak | $ 79.95 | $ 68.00 |
| 26-3012 Deluxe Joystick (EACH) | $ 39.00 | $ 34.00 |
| 26-3017 64K RAM Kit | $ 69.95 | $ 59.00 |
| 26-3025 Color Mouse | $ 49.95 | $ 42.50 |
| 26-1173 Modem II | $ 199.95 | $ 169.00 |

| | LIST PRICE | OUR PRICE |
|---|---|---|
| 26-3008 Joysticks | $ 24.95 | $ 21.00 |
| 26-3016 Keyboard Kit | $ 39.95 | $ 34.00 |
| 26-3018 Ext. BASIC Kit | $ 39.95 | $ 34.00 |
| 26-1175 Modem I | $ 99.95 | $ 85.00 |
| Hayes Modems | | $ CALL |

All prices and offers may be changed or withdrawn without notice. Advertised prices are cash prices. (Installation and shipping are not included in price.)

C.O.D., Visa, MasterCharge, and American Express welcome. Please call (517) 625-4161 for free price list or information.

**PERRY COMPUTERS • DEPT. NO. A1 • 137 NORTH MAIN STREET • PERRY, MI 48872** ✓124 tice. To someone actually living as part of it, the situation is different.

Because he does not know the states of all the cells in the universal lattice, he does not know for certain whether an elementary particle exists at any given instant in any particular space quanta or cell.

Remember the first definition of randomness. If the arrangement of particles in the universe is truly random, and if a truly random sequence cannot be specified by less information than is contained in itself, then a complete replica of the universe is needed to derive concrete information about the state of even its smallest part.

Just because you can never be sure of the exact state of a region of space, it does not mean that the world is ruled by chance. It might be only a natural consequence of our limited knowledge of a universe that is, as far as we know, infinite.

In the Stars simulation, you can imagine the interaction field as extending infinitely beyond the small portion actually displayed on the screen. Since it is impossible to compute interactions on an infinite lattice, you use random numbers to fake the influence of the off-screen positions. Because the unknown universe is so large compared to the known, its influence is extremely smooth, well distributed, and unpredictable, precisely the qualities valued in a pseudo-random-number generator.

**Further Experiments**

It is a straightforward matter to increase the number of points or the size and dimension of the lattice. The 16K version of Stars manipulates 1,000 points over a two-dimensional lattice that is for computational purposes (i.e., possesses a known universe of) 255 cells long and 255 cells wide. This came about because 255 is the largest number that can be expressed by a byte.

Linkage to machine-language routines is easy for data in this form and the lattice roughly fits the Extended Basic high-resolution screen. Overhead for storage is 2,000 bytes (1,000 points with 2 bytes for x and y coordinates).

Expansion to three dimensions adds one more coordinate and increases overhead to 3,000 bytes. The prejudicing routine needs to deal with one more axis, but the increase in memory and computing time is modest.

Expansions of space-oriented routines such as the traditional Life implementations are usually more costly. Suppose you want to expand the routine to handle 1,000 points over a three-dimensional lattice 65,535 cells wide, high, and deep.

This particular dimension is a result of the fact that 65,535 is the largest integer that can be specified by a 16-bit word. Memory overhead is now 6,000 bytes. On the other hand, the more usual space-oriented routines require an increase in memory to accommodate a number of cells that would be the cube of 65,535. The Tandy-Microsoft floating-point arithmetic rounds this number to 279,149,246,000,000.

The idea of crunching numbers on this scale could give indigestion to even a supercomputer. One of the big Defense Department systems calculating a million lattice cells per second might be expected to come with a new configuration of positions every few years if it runs continuously.

It is sometimes possible to save a few million dollars in hardware by changing a few lines in a program.

*“. . . it appeared to the ancients that the runner would never overtake the tortoise.”*

**Lattice Mechanics**

The notion of force is so central to the traditional mechanics that it is difficult to define except by synonym or circularity. I define it as: A word generally found in the first chapter of physics texts that must be accepted as an article of faith in order for the rest of the book to make sense.

More seriously, forces are thought to convey action, change, or causation. Forces make things happen. An orange falls off the table. Why? A force caused it to fall. Unfortunately, this simple view has never yielded consistent mechanics.

Uncertainty, combined with the equivalence of mass energy, might have some odd consequences. For one thing, even in total vacuums, there is a chance that energies might be high enough to constitute a particle. Other theoretical and experimental considerations point to uncertainty as either the mechanism for, or as an effect of, the spontaneous creation of particles from the vacuum. Evidence suggests the phenomena is augmented by the presence of nearby mass. The Stars simulation is an exploration of this notion.

This raises the suspicion that forces might be phenomena rather than causes.

If you applied the same sort of statistical analysis to the phenomena of falling objects as was applied to the distribution of stars in the sky in the first installment of this article, you might suppose that an orange falls because, from one instant to the next, the probability that it will be closer to the Earth is slightly greater than the possibility that it will be further away.

Obviously, things are more complicated than that. Perceivable objects are not indivisibly whole. They are more or less stable constellations composed of huge numbers of subatomic or even subquarkic particles.

Classical physics assumes infinite divisibility of measurement. General Relativity does also, and for this reason does not mesh well with the integer math of quantum dynamics. These theories also assume a quality of matter that might be called continuity of constituent identity. That is, an ordinary object is not only the same in general form from one instant to another, but the individual particles composing it remain the same.

For an opposing analogy, the United States Senate has the same formal identity as it did in 1900 even though none of the members are the same now as then. Similarly, in the “growth from fixed points” variation of the program the two clusters retain identity as perceptual objects for quite a while even though none of the point members remain the same for more than one generation. Such associations when regarded as physical objects have interesting mechanics.

For one thing, movement of the clusters is free from Zeno’s paradox. This is the famous quandary raised by a hypothetical race between Achilles and a tortoise. If an analysis of the motion was done in arbitrarily small increments then it appeared to the ancients that the runner would never overtake the tortoise.

Of course people went on to extend the number system by infinitesimals and invent calculus and the classical mechanics of motion, but the paradox has never been completely laid to rest.

With regard to the two fixed-point clusters, the question is: Will there be a tendency for the two clusters to gravitate toward each other? That is to say, will a phenomena take place that an observer might interpret as a force between them?

The probability that a point will die is about equal over the entire lattice. But the birth probabilities are enhanced by the regions of each cluster closest to the other because of the proximity of the other cluster's points.

You can base many interesting experiments on this model. The most obvious is to keep track of the position of the two clusters to see if their individual centers of gravity approach or recede from each other.

With a limited number of points, the statistical noise is extremely high, so the clusters might disperse more than interact. The remedy is to repeat the experiment to get average tendencies, and to increase the number of points as much as memory permits. The interaction-distance parameter can be set in the program. Short settings result in tight clusters that retain identity for a long time but interact only slightly.

Another topic of interest is the formation of stabilization structures. Ordinary matter has many levels of structure that give it form and chemical properties. Such structures may form spontaneously (or by seeding or templating) as higher-order aggregations of the primitive, relatively formless clusters that have been the objects of study.

> *"How do home computers compare with mainframes?"*

It is not yet clear how large a simulation would be necessary to demonstrate structure of this kind, or if the particular lattice rules used here are consistent with such stable formations. Trying out different sets of lattice rules is a potentially rich field for experimentation.

## Big Problems and Small Computers

Because microcomputers are small and affordable, many think they are inappropriate tools for serious research. How do home computers compare with mainframes? If performance were proportional to prices, you might expect the big systems to be hundreds of times more powerful.

James R. Lewis and Al Moreira made comparisons between the speed of the IBM 370/148 and the CoCo's Motorola 6809 microprocessor, which were published in *Byte* and *68 Micro Journal*. In a prime-number-finding benchmark test, the 370/148 computed primes up to 10,000 in about a minute while a 6809 running at 1 million cycles per second required a little more than six minutes. Most Color Computers can be made to operate their 6809Es at 1.79 MHz, so this particular test should take less than four minutes.

Of course, it is impossible to make definitive comparisons between systems so different. But you can say that running a Color Computer overnight on a long problem is roughly equivalent to a couple of free hours on some common mainframes.

If you enjoy exploring what the world is made of and how it operates, or speculating about how possible worlds might behave, you don't have to have access to some unfriendly monster that takes up two floors of a data-processing center. The simple iterative procedures can be done by anybody with a personal computer and the time to let it run.

Those who can shake off the jibes of the dinosaur keepers and the widespread idea that everything important has already been discovered will find an open frontier to explore. ■

---

*Address correspondence to Philip McLaughlin, 712 Roberts St., Denton, TX 76201.*

---

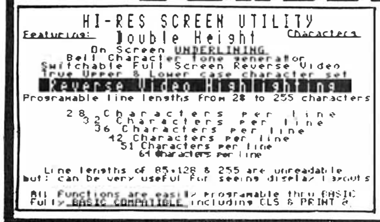
**Movies**

Two options offered by Part I last month (Program Listing 2, View) allowed disk users to see movie sequences. These will not work until you produce proper data by using the auto-save-to-disk option in the Stars program. To produce data compatible with the movie routines, you must enter a 1 in response to the "save every (how many) generations?" prompt.

Left running, the Stars program will continue saving data until the disk is full and a DF ERROR appears. Each generation takes about seven minutes.

The controlled-movie option of the View program asks you how many generations are recorded on the disk, but the movie option (first option in the program) assumes that there are at least 10 (line 54100 of Listing 2). If either movie option attempts to read data not on the disk, an NE ERROR occurs.

HI — RESOLUTION SCREEN UTILITY



```
          HI-RES SCREEN UTILITY
Featuring:     Double Height     Characters
         On Screen UNDERLINING
      Bell Character Tone generator
    Switchable Full Screen Reverse Video
    True Upper & Lower case character set
        Reverse Video Highlighting
Programable line lengths from 28 to 255 characters

        28 Characters per line
          32 Characters per line
           36 Characters per line
             42 Characters per line
              51 Characters per line
                64 Characters per line

    Line lengths of 85,128 & 255 are unreadable
but: can be very useful for seeing display layouts

   All Functions are easily programable thru BASIC
   Fully BASIC COMPATIBLE including CLS & PRINT @
```

- FULLY BASIC COMPATIBLE
- DISPLAY FORMATS OF 28 to 255 CHARACTERS PER LINE
- FULL 96 UPPER LOWER CASE CHARACTERS
- MIXED GRAPHICS & TEXT OR SEPARATE GRAPHIC & TEXT SCREENS
- INDIVIDUAL CHARACTER HIGHLIGHTING
- REVERSE CHARACTER HIGHLIGHT MODE
- WRITTEN IN FAST MACHINE LANGUAGE
- AUTOMATIC RELOCATES TO TOP OF 16 32K
- AUTOMATICALLY SUPPORTS 64K of RAM WITH RESET CONTROL
- REVERSE SCREEN
- ON SCREEN UNDERLINE
- DOUBLE SIZE CHARACTERS
- ERASE TO END OF LINE
- ERASE TO END OF SCREEN
- HOME CURSOR
- BELL TONE CHARACTER
- HOME CURSOR & CLEAR SCREEN
- REQUIRES ONLY 2K OF RAM
- COMPATIBLE WITH ALL TAPE & DISK SYSTEMS

$19.95

NEW NEW

Introducing The "Super Smart"

DATA PACK II

Terminal Communications Sotware

NEW NEW

"FEATURES"

- No Lost Information When Using Hi-Resolution Display On Line
- ASCII Compatible File Format
- Full Text Buffering
- Terminal Baud Rates 300 to 9600
- Automatic Word Wrap Eliminates Split Words
- Full/Half Duplex
- Automatic File Capture
- Programmable Word Length, Parity and Stop Bits
- Save and Load Text Buffer and Program Key Buffers to Tape or Disk
- 9 Hi-Resolution Display Formats, 28 to 255 x 24
- True Upper/Lower Case Display
- Kill Graphics Option for An Extra 6K
- Supports Line Break
- Freeze Display and Review Information On Line
- Send Files Directory from Buffer or Disk
- Full Disk Support for Disk Version
- Send Control Codes from Keyboard
- Separate Printer Baud Rates 110-9600
- Display On Screen or Output Contents of Buffer to Printer
- Automatic Memory Sense 16-64K
- 9 Programmable Function Key Variable Length Macro Buffer
- Programmable Prompt Character or Delay to Send Next Line
- Programmable Control Character Trapping
- Programmable Open/Close Buffer Characters
- Automatic Key Repeat for Editing
- Program and Memory Status Displays

DISK $44.95

TAPE $34.95

9 Unlimited Variable Length Macro Key Buffers

BUFFER EDITOR Insert, Delete Change or Add To Buffer

CER COMP

64K Support Up To 55K Text Buffer

28-64x24 Hi-Resolution Display

5566 Ricochet Avenue
Las Vegas, Nevada 89110

(702) 452-0632

All Orders Shipped From Stock
Add $2.50 Postage

335

NEW NEW NEW NEW NEW NEW NEW NEW NEW NEW

**SUPER BACK-UP UTILITY©**

....WITH S.B.U. FROM COMPUTIZE - YOU'LL NEVER NEED ANOTHER BACK-UP UTILITY FOR YOUR COCO!!!

SUPER BACK-UP UTILITY WILL PERFORM ALL OF THE FOLLOWING FUNCTIONS:

1. TAPE TO TAPE (Regardless of most protection schemes!)
2. TAPE TO DISK (Move Cassette programs to Disk!)
3. AUTO RELOCATE (For those Cassette programs that conflict with Disk operating sys.)
4. DISK TO TAPE (Place Disk programs onto Cassette)
5. DISK TO DISK (Our powerful Spit-N-Image Program. *Regardless of protection schemes!)

- MENU DRIVEN!
- REQUIRES 32K EXTENDED COCO
- REQUIRES 1 OR 2 DRIVES (For Disk Functions)
- ALL MACHINE LANGUAGE!!!

★★★ONLY $49.95!★★★
(SUPPLIED ON DISK)

COMPARE WITH OTHER INDIVIDUAL PROGRAMS COSTING IN EXCESS OF $100.00 OR MORE!!!

Check or M.O.

COMPUTIZE INC.
P.O. BOX 207
LANGHORNE, PA 19047

Add $2.00 Shipping
PA Res. add 6% sales tax

~182

215 - 946-7260

* 96K EXPANDERS *

Use all of your memory in 64K Computers. The 96KX is in permanent ROM & occupies the upper 8K. Compatible with disk drives & accessories. Module mounts inside computer & cartridge is for tape or multipack selectors. 96KX-M $59.95, 96KX-C $49.95

* VIDEO REVERSER *

Provides (1) Reversed, (2) Reversed all capitals, & (3) Normal. Solderless installation. $19.95

* DYNAMIC COLOR NEWS *

A monthly engineering newsletter that explains how the Color Computers work in nontechnical terms. Includes Basic & Machine Language Programming, expansion techniques, questions & answers, etc. Receive discounts on our products. $15/yr, Sample $1

MEMORY EXPANDERS

No trace cutting, solderless, & reversible.

| | |
|---|---|
| ME-3 . . . D, E, & 285 from 16K to 32K | $36.95 |
| ME-4 . . . D & E computers to 64K | $89.95 |
| ME-4F . . F or 285 and COCO 2 to 64K | $79.95 |
| ME-128-64 . 64K computers to 128K | $199.00 |

We will loan you a computer while we upgrade yours.

| | |
|---|---|
| DISASM - Decimal Disassembler & Assembler | $19.95 |
| DYTERM - 300 to 2400 baud Terminal Program | $14.95 |
| MPM - Stack 5 programs in 32K computers | $14.95 |

| | |
|---|---|
| New 64K CoCo 2 with 96KX & video reverser | $325.00 |
| Used 128K TDP-100 with 96KX & video rev. | $395.00 |

Free catalog. Checks, VISA & MC cards. Add $2 ship. 24 hr. phone. Call at nights & on weekends & save

DYNAMIC ELECTRONICS INC.
Box 896 (205) 773-2758
Hartselle, AL 35640

~72

**The choice is yours — and you can get your first issue free if you subscribe now**

If you want to make the most of your new Dragon computer, then you need **Dragon User**. This independent, international magazine for all Dragon owners is packed with software and hardware advice.

Regular features:
- Pages of program listings
- Chance to win $300 prizes
- Advice on which software to buy
- In-depth hardware evaluations
- Technical advisory service
- All the latest news

If you've ever been killed by the evil goblin, flamed by a dragon or turned to stone by a wizard, then you need **Micro Adventurer** — the new magazine devoted to all microcomputer adventures, war games and simulations.

Each issue features:
- Helpline and Contact columns
- Reviews of the latest adventures
- Competitions with exciting prizes
- Adventures to type in and play
- Advice on how to write your own adventures
- Profiles of famous adventurers

**Subscription form**

Fill in this form and send it to the appropriate magazine's subscription department, c/o **Business Press International, 205 East 42nd Street, New York, NY 10017.**

Please send me 13 issues of
☐ **Micro Adventurer** at US$33.95
☐ **Dragon User** at US$29.95

This is the usual rate for a year's subscription (12 issues).

**Name** __________

**Address** __________

**Signature** __________

**Date** __________

Please start my subscription from the following issue __________

This form should be accompanied by a check made payable to the magazine to which you are subscribing.

~27

BY JAMES J. BARBARELLO

# ATARI JOYSTICK INTERFACE

If you've ever played video games in an arcade or on another microcomputer and then tried them on the CoCo, chances are you were frustrated with Radio Shack's joysticks. They just aren't sensitive enough for some of the fast, precise action necessary in some games. And they often don't hold up well in the intense heat of play.

After the fifth or sixth joystick repair job, I knew there had to be a better way. The easiest alternative would be to buy one of the many available Atari-to-CoCo joystick interfaces, but these cost about $20 per joystick, and you still have to buy the joysticks.

Since Atari joysticks are available from a number of sources for well under $10 a pair, why not build a simple interface myself and pocket the difference?

That thought resulted in the CoCo Joycard—a simple construction project that interfaces an Atari joystick to the CoCo. In addition, the Joycard provides a jumper-selectable option for either single-shot or rapid firing. Best of all, the total cost for one joystick and interface should be under $10.

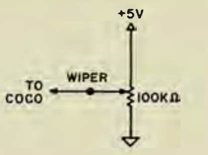


*Figure 1.*

Tired of joysticks that don't stand up to your style of play? Adapt the inexpensive Atari sticks.

### Number Please

Take a look at the Radio Shack joystick. Figure 1 shows one of the two joystick potentiometers (pots). Note that one end is attached to 5 volts and the other to ground (0 volts). As you move the pot's wiper, the output voltage varies between the two voltage extremes. When the wiper is in the middle of the pot (at rest) the output voltage is one-half the maximum (2.5 volts).

Figure 2 shows a circuit that forms the basis of the interface. First, when the joystick is at rest, the output must be 2.5 volts. This occurs with switches S1 and S2 open. Closing S1 raises the output to 5 volts (indicating left or up, for instance). Reopen S1 and close S2 to drop the output to 0 volts (indicating right or down).

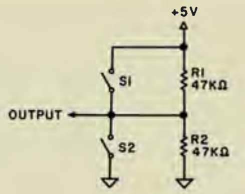


*Figure 2.*

Figure 3 shows a representation of an Atari joystick. As you move the stick to a vertical or horizontal position, one switch closes (moving in a diagonal position closes two adjacent switches). But notice that all switches (including the fire switch) are connected together on one side.) Therefore, you can't use the joystick directly in our circuit of Fig. 2, since the common points for the up/down, left/right, and fire switches must be isolated from each other.

Enter the circuit in Fig. 4. This complete schematic of the CoCo Joycard and joystick contains the 4016 CMOS Quad Analog switch, an integrated circuit that has four separate,

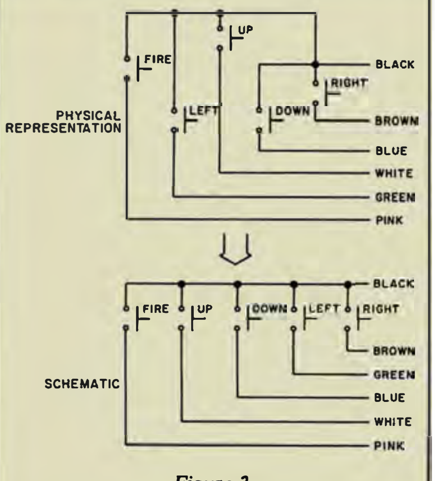


*Figure 3.*

electrically controlled transmission gates (switches). Each switch has an input (pin 1 for the first switch), an output (pin 2), and a control (pin 13).

When no voltage reaches the control pin, the resistance between input and output becomes so large that you can consider it an open circuit. When it receives 5 volts, the resistance drops to below 200 ohms (low enough to consider it a short circuit). You can consider each gate a single-pole, single-throw switch that is activated by a control signal.

Figure 4 contains two circuits that are similar to Fig. 2. In Fig. 4, however, transmission gates replace the two switches. R1, R3, R5, and R7 provide the 0-volt reference when the joystick switches are open.

When a joystick switch is closed, 5 volts from the common line pass through it to its companion transmission gate. That gate shorts out its corresponding resistor, changing the output voltage provided to the CoCo.

When the stick is at rest, all joystick switches are open, and all transmission gates act like open switches. Thus, no resistors are shorted, and the CoCo receives a midposition indication.

The remaining portion of the circuit is for the fire switch. The CoCo expects to see an open circuit or 5 volts when the fire switch is open. When you press the fire switch, the CoCo expects 0 volts.

IC2 is half of a 4011 CMOS Quad two-input NAND gate. As wired, the two NAND gates form a "gated" oscillator operating at about 10 Hz (10 cycles per second). As long as pin 1 is referenced to ground (as when the joystick fire button is open), the oscillator does not operate and the output from pin 3 is at 5 volts.

When you press the fire button, 5 volts pass to pin 1 and the oscillator begins running. The output then varies rapidly between 0 and 5 volts, simulating a player with extremely fast responses! If you remove jumper J (single-shot mode) and press the fire button, the output from pin 3 goes high and stays there until you release the button.

## Construction

This construction approach presumes that you will only use the Atari joysticks on the CoCo. First, construct the printed circuit board (PCB) shown in Fig. 5. When you've finished it, begin installing resistors R1–R10 and C1 as shown in Fig. 6. Finally, install CMOS integrated circuits IC1

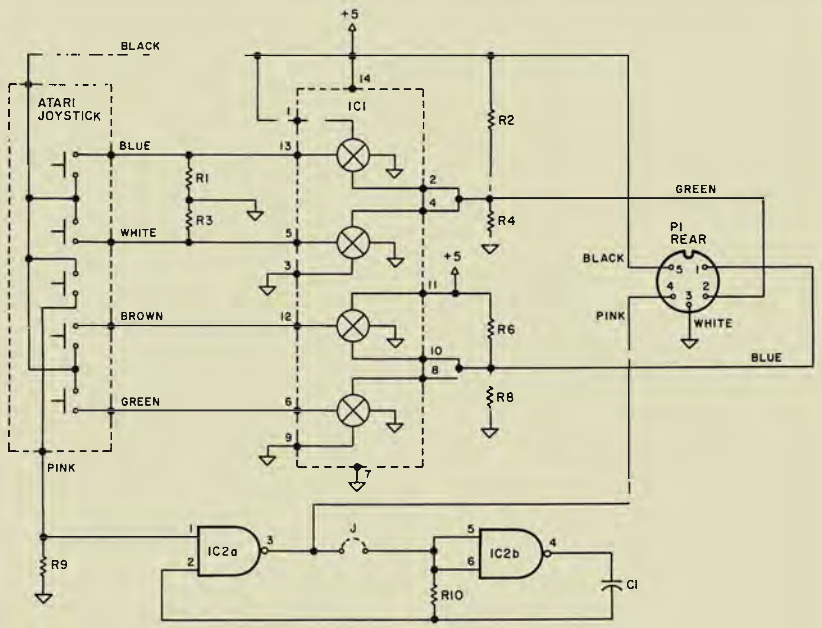

+5
BLACK
ATARI JOYSTICK
BLUE
WHITE
BROWN
GREEN
PINK
R1
R3
R9
14
IC1
1
13
5
3
12
6
9
7
2
4
11
10
8
R2
R4
+5
R6
R8
GREEN
P1 REAR
BLACK
PINK
WHITE
BLUE
5
1
4
2
3
J
IC2a
IC2b
R10
C1

*Figure 4.*

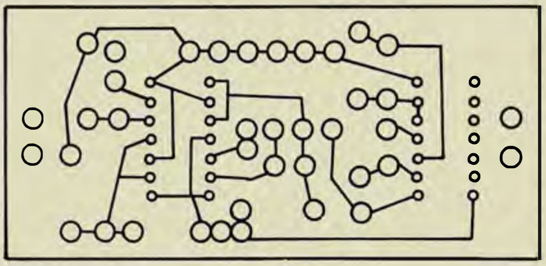


*Figure 5.*

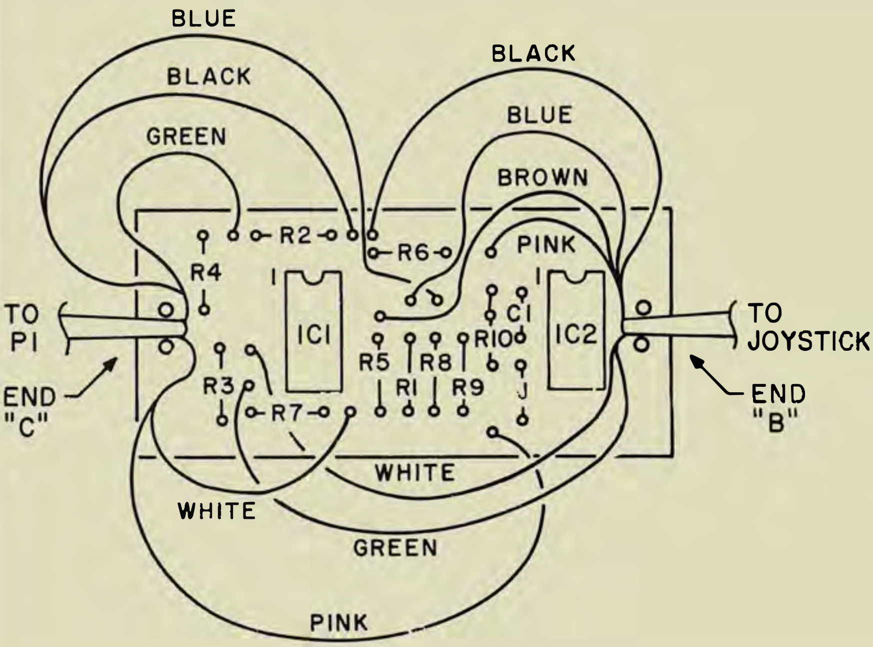

BLUE
BLACK
GREEN
BLACK
BLUE
BROWN
PINK
R2
R6
R4
1
IC1
C1
R10
IC2
TO P1
R5
R8
R1
R9
J
R3
R7
END "C"
TO JOYSTICK
END "B"
WHITE
WHITE
GREEN
PINK

*Figure 6.*

and IC2, being sure to observe the polarity shown.

These devices are static sensitive, so handle them as little as possible. Before touching them, touch a ground point (such as the screw holding an electrical outlet cover) to remove any charge you might have.

Now proceed to the joystick modifications. Cut off and discard the connector at the end of the cable. Measure in from this cut end about 1 foot and cut the cable again. You now have a 1-foot piece and the cable that connects to the joystick (as shown in Fig. 7).

Strip 2 inches of outer covering from end C and 2½ inches from end B. Strip ¾ inches of covering from end A. Cut off the brown wire from ends A and B (leaving five wires on each end). Strip ¼ inch of insulation from each wire on ends A, B, and C.

Attach the wires from ends B and C to the PCB as shown in Fig. 6. Then attach the wires from end A to the DIN connector. Place ends B and C over the double holes on either end of the PCB. Secure the cables to the PCB by passing a wire tie strap through one hole, back through the other and over the cable. Then close the tie strap tightly and clip off the excess.

### Testing

Turn on your CoCo and plug the joystick into the right joystick port. Enter this short test program:

```
10 CLS:X=16:Y=8
20 A=JOYSTK(0)
30 IF JOYSTK(0)=0 THEN
     X=X-1-(X=0)
40 IF JOYSTK(0)=63 THEN
     X=X+1+(X=31)
50 IF JOYSTK(1)=0 THEN Y=Y-1-(Y=0)
60 IF JOYSTK(1)=63 THEN
     Y=Y+1+(Y=14)
70 IF (PEEK(65280) AND 3)=2 THEN SC=4
     ELSE SC=0
80 CLS SC:PRINT@X+Y*32,CHR$(148);:
     GOTO 20
```

When you run the program, the screen clears to black with a small yellow rectangle in its center. If you move the stick to the left, the rectangle should also move to the left. Now move the stick in different directions (including diagonally) and see if the rectangle moves in the same directions. Press the fire button and the screen should flash red.

Line 20 of the test program samples the joystick ports. If you were using the left joysticks (JOYSTK(2) and JOYSTK(3)) you would still need this line, since JOYSTK(0) tells the CoCo to look at the joysticks and get their current value.

The formula in line 30 uses a truth test (i.e., (X=0)) to check for the screen borders. If the test is false (as when X equals 1), it returns a zero. If the test is true, it returns a −1. So when X is not equal to zero, the formula reduces to X=X−1. When X is decremented past one and equals zero, the formula keeps X at zero (X=X−1−(−1)).

Lines 40, 50, and 60 use a similar truth test to keep the rectangle within the screen borders.

Line 70 PEEKs the fire-button location and determines if you've pressed the left button (=1), the right button (=2), or no buttons (=0). Since you're using the right joystick, SC (screen color) changes to red (4) only if you've pressed the right button.

Line 80 clears the screen to the appropriate color and prints the yellow rectangle (CHR$(148)) at the updated screen position that X and Y determine. Then execution returns to line 20 for the next sampling of the joystick.

### Use

Many popular games (like Donkey Kong and Pacdroids) can use the joystick without any modification, since these games look to see whether the joystick is at one extreme (0) or the other (63). You can adapt Basic games that rely on a specific number from the joystick but are actually just determining direction of movement by using the logic of the test program.

You should realize that the number produced when the joystick is at rest cannot be exactly 32. From Fig. 2, note that when both S1 and S2 are open (stick at rest), the output is the ratio R1/(R1+R2). If R1 equals R2, then the output ratio is exactly 1:2 which produces the number 32.

Since the resistors' values can vary by as much as 5 percent, the ratio can be somewhat less or greater than 1:2. However, with standard 5-percent resistors, the number generated should not be less than 30 or more than 34. If necessary, you can select resistor values very close to each other so your joystick produces a 32 at rest. In most instances, however, this will not be necessary. ■

---

*Address correspondence to James J. Barbarello, R.D. #1, Box 241H, Tennent Road, Englishtown, NJ 07726.*

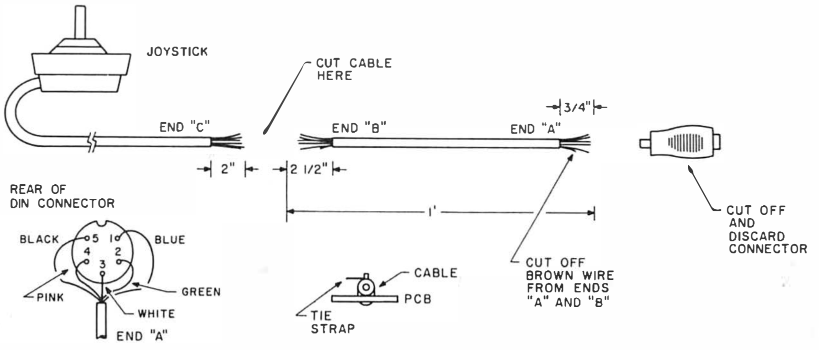


*Figure 7.*

(Note: All resistors are ¼ watt, 5 percent)

| | |
|---|---|
| R1–R9 | 47,000 ohms |
| R10 | 1,000,000 ohms |
| C1 | 0.1 μF, ceramic disk capacitor (10 volts or greater) |
| IC1 | 4016 CMOS Quad Analog switch |
| IC2 | 4011 CMOS Quad 2-Input NAND gate |
| P1 | 6-pin stereo DIN plug (Philmore EA-9 or equal) |

Miscellaneous: Atari joystick (available from Digikey Corp. or other mail-order suppliers for $7 to $10 a pair), wire tie straps (Radio Shack part number 278-1632), printed circuit board, solder, etc.

*Table 1. List of Materials*

# YORK 10® CASSETTES

## COMPUTER GRADE
## • DATA TRAC •
## BLANK CASSETTES

✓156

**C-05, C-06, C-10, C-12, C-20, C-24, C-32**

From the leading supplier of Computer Cassettes, new, longer length C-12's (6 minutes per side) provide the extra few feet needed for some 16K programs.

- BASF-LHD (DPS) world standard tape.
- Premium 5 screw shell with leader.
- Internationally acclaimed. Thousands of repeat users.
- Error Free • Money back guarantee.

**Call: 818/700-0330**
FOR IMMEDIATE DELIVERY
on Credit Card Orders.

*BUY THE BEST, AT FACTORY-DIRECT PRICES*

✱ 500 C-12's or C-10's — 38¢ each
w/labels, add 4¢ • Shipping $17/500
500 Boxes 13¢ea • Shipping $10/500
(Free Caddy offer does not apply)

TRACTOR FEED • DIE-CUT
BLANK CASSETTE LABELS
WHITE $3.00/100 $20.00/1000
NEW COLORED LABELS • Pastels - Red, Blue, Green, Yellow, Lavender
$4.00/100 $30.00/1000

CASSETTE STORAGE CADDY
Holds 12 cassettes $2.95
w/o boxes
Includes edgelabels and index card

FREE
1 CADDY WITH EVERY
4 DOZ. CASSETTES PURCHASED
(does not apply to 500 quantity offer)

*ORDER NOW . . . MAIL TO –*
**YORK 10**
9525 Vassar Ave. #HC
Chatsworth, CA 91311

ORDER FORM

| ITEM | 1 DOZEN | 2 DOZEN | TOTAL |
|---|---|---|---|
| C-05 | ☐ 7.00 | ☐ 13.00 | |
| C-06 | ☐ 7.00 | ☐ 13.00 | |
| C-10 | ☐ 7.50 | ☐ 14.00 | |
| C-12 | ☐ 7.50 | ☐ 14.00 | |
| C-20 | ☐ 8.75 | ☐ 16.50 | |
| C-24 | ☐ 9.00 | ☐ 17.00 | |
| C-32 | ☐ 11.00 | ☐ 21.00 | |
| Hard Box | ☐ 2.50 | ☐ 4.00 | |
| Wht. Labels | ☐ 3.00/100 | ☐ 20.00/1000 | |
| Color Labels<br>Color ____ | ☐ 4.00/100 | ☐ 30.00/1000 | |
| Storage Caddy @ 2.95 ea. Qty.____ | | | |
| SUB TOTAL | | | |
| Calif. residents add sales tax. | | | |
| Shipping/handling | | | 3.50 |
| Outside 48 Continental States — Additional $1 per caddy; per doz. cassettes or boxes. | | | |
| TOTAL | | | |

#HC

Each cassette includes 2 labels only. Boxes sold separately. In Continental U.S. shipment by U.P.S. If Parcel Post preferred, check here. ☐

Check or M.O. enclosed ☐ Send Quantity Discounts ☐
Charge to credit card: VISA ☐ MASTERCARD ☐

Card No. ______________________ Exp. ________

Name ______________________

Address ______________________

City ______________ State/Zip ______________

Signature ______________ Phone ______________

Ask about our DUPLICATING SERVICE

# CP/M
## FOR YOUR COLOR COMPUTER

- Now have access to the largest library of programs available
- CP/M is the recognized leader in professional and personal software
- Adds the power of a 4 MHz, Z80A
- CP/M 2.2 included
- No modifications are necessary. Simply plug into the cartridge port and plug Radio Shack's disk controller into it.
- Maintains full Radio Shack compatibility
- Requires 64K memory and one or more disks with controller

**$250.00**

**WAYNE TECHNOLOGY**
P.O. BOX 5196 • ANAHEIM, CA 92804-1196
(714) 772-5757

✓170

*Radio Shack™ Tandy / Radio Shack Corp. / CPM™ Digital Research*

# WORKBASE

SALES OR CLIENT PROFILE
APPOINTMENT SCHEDULES
INVENTORIES
ORDER ENTRY
REAL ESTATE
MAILING LISTS
LEDGERS
STUDENT OR PERSONNEL RECORDS
PROPERTY RENTALS
LISTINGS

CAN YOUR DATA BASE REMEMBER HOW YOU DID IT LAST TIME?

CAN YOUR SECRETARY RUN REPORTS AND POST TRANSACTIONS USING YOUR DATABASE?

CAN YOU DEFINE AND SAVE REPORTS AND CALCULATIONS WITH RECORD SELECTION & SORT PARAMETERS?

## THE DATABASE SYSTEM DESIGNED FOR BUSINESS

IS YOUR DATABASE ALL-IN-ONE INTEGRATED PACKAGE?

CAN YOU PRINT INVOICES AND STATEMENTS?

CAN YOU PRINT TRANSACTION SUMMARIES BY ACCOUNT?

CAN YOU SELECT, SORT, & PRINT FORM LETTERS & LABELS IN ONE OPERATION?

NEW!! FROM THE CREATORS OF HOMEBASE!!

**ALL-IN-ONE INTEGRATED PACKAGE: DATABASE, SPREADSHEET, WORD PROCESSING & MAILMERGE**
**INTRODUCTORY PRICES: WORKBASE I $64.95 400 RECORDS —— WORKBASE II $79.95 1200 RECORDS**

**CALL TOLL FREE: 1-800-334-0854 (EXT 887)**
**OR SEND CHECK OR MONEY ORDER TO:**

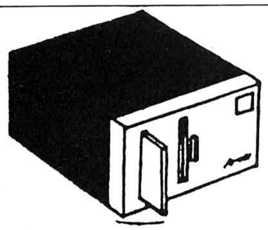
**WORKBASE DATA SYSTEMS**
**P.O. BOX 3448, DURHAM, NC 27702**

✓359

**Saguaro Software**

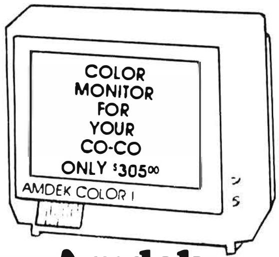
We Are Discount Distributors Of Prickly-Pear, Petrocci, Sugar, And Tom Mix Software.

✓70



**Continued Low Price**
**Amdek Dual 3″ Disk Drive**
**$475⁰⁰**
(Retail $599)
**Includes 2 Drive Cable**
**And 2 Diskettes**
Plus Shipping
**First box of 10 3″ disks - $45.00**

10-3″ diskettes - $55.00
R.S. disk controller, $135 with Amdek, $150 alone.
R.S. disk manual - $12.00



**Amdek**
**Color I +**
Only
**$299**

Video Interface
$20 With Purchase

7331 E. Beverly, Dept. H • Tucson, AZ 85710
**(602) 885-6508**
Az. Residents Add 7% Tax

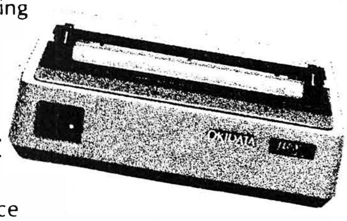
VISA MasterCard

# PRINTER SALE

**$189**

## ML 80 Features

- 80 cps, unidirectional printing
- 80 columns standard, 132 condensed
- TRS-80 character set
- Graphics, 64 block shapes
- Long-life, 7- pin print head, warranted for one full year
- Friction & pin paper feeds
- Parallel Centronics interface



**OKIDATA**

**SUNLOCK SYSTEMS**
4217 Carolina Ave.
Richmond, Va. 23222

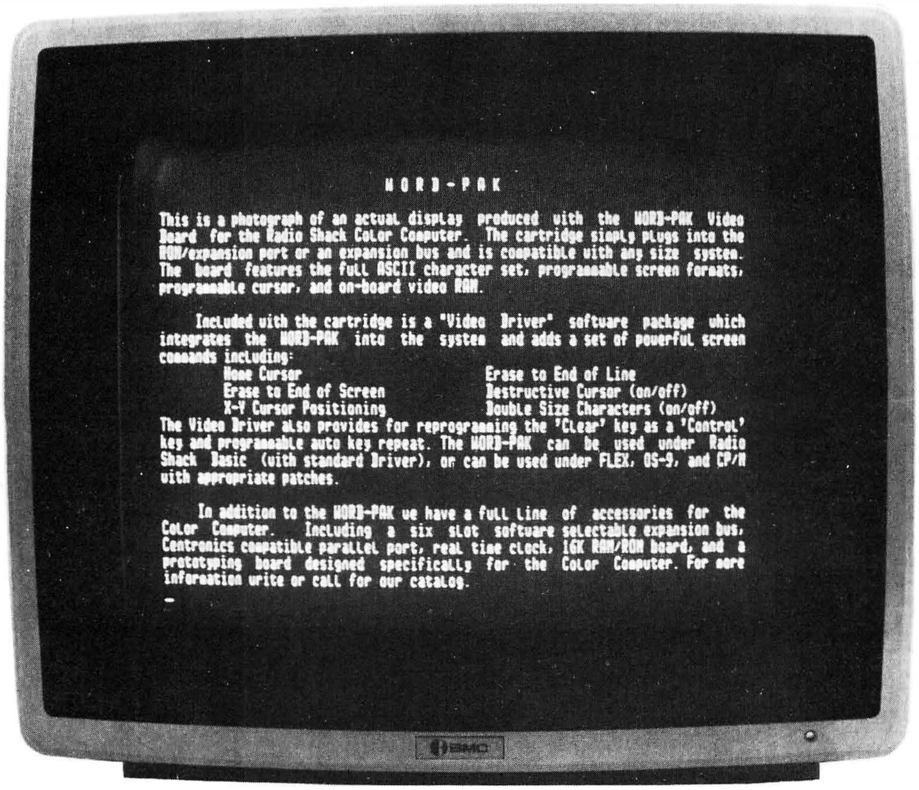
✓456

ADDITIONAL PRINTER SPECIALS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Epson | | Okidata | | Brother 15 | $479 | CItoh 8510 | $359 |
| RX80 | $299 | ML82 | $349 | Brother 25 | 739 | CItoh F10 | 1099 |
| 80FT | 369 | ML83 | 569 | Gemini 10X | 279 | Sv.Reed 500 | 429 |
| RX100 | 529 | ML84 | 975 | Man/Tal 80 | 319 | Diablo 620 | 949 |
| FX80 | 479 | ML92 | 429 | Qume 1140 | 1349 | NEC 2000 | 849 |
| FX100 | 649 | ML93 | 699 | SCM TP-2+ | 449 | NEC 3510 | 1499 |

**TO ORDER CALL TOLL FREE 800-368-9191**
In Virginia call 804-321-9191
We accept MasterCard, Visa and CODs

# A Picture Is Worth . . .



```
                         W O R D - P A K

This is a photograph of an actual display produced with the WORD-PAK Video
Board for the Radio Shack Color Computer. The cartridge simply plugs into the
ROM/expansion port or an expansion bus and is compatible with any size system.
The board features the full ASCII character set, programmable screen formats,
programmable cursor, and on-board video RAM.

    Included with the cartridge is a "Video Driver" software package which
integrates the WORD-PAK into the system and adds a set of powerful screen
commands including:
      Home Cursor                     Erase to End of Line
      Erase to End of Screen          Destructive Cursor (on/off)
      X-Y Cursor Positioning          Double Size Characters (on/off)
The Video Driver also provides for reprogramming the 'Clear' key as a 'Control'
key and programmable auto key repeat. The WORD-PAK can be used under Radio
Shack Basic (with standard Driver), or can be used under FLEX, OS-9, and CP/M
with appropriate patches.

    In addition to the WORD-PAK we have a full line of accessories for the
Color Computer. Including a six slot software selectable expansion bus,
Centronics compatible parallel port, real time clock, 16K RAM/ROM board, and a
prototyping board designed specifically for the Color Computer. For more
information write or call for our catalog.
_
```

pbJ inc.

✓214

P.O. BOX 813
N. Bergen, N.J. 07047
**(201) 330-1898**

## COLOR COMPUTER SOFTWARE

**SUPER SLEUTH DISASSEMBLER EACH $99-FLEX, $101-OS/9**
interactively generates source on disk with labels, includes xref
specify 680x/6502 version or Z-80/8080/85 version
(OBJECT ONLY) EACH $50-FLEX & OS/9, $49-COCO DOS
COCO DOS available in 680x/6502 version only

**CROSS-ASSEMBLERS EACH $50-FLEX, $55-OS/9, ALL $100**
specify for 6800/1, 6502, 6805, Z-80, or 8080/48/85
OS/9 version requires Microware RMA or FHL OSM macro assembler
FLEX version requires TSC ASMB or FHL ASM or OSM macro assembler

**DEBUGGING SIMULATORS EACH $75-FLEX, $100-OS/9**
specify for 6800/1, 6805/146805, or 6502

**6502 TO 6809 ASSEMBLER TRANSLATOR $75-FLEX, $85-OS/9**
translates 6502 programs to 6809, noting inexact conversions

**6800 TO 6809 & 6809 PIC TRANSLATORS $50-FLEX, $75-OS/9**
translates 6800 programs to 6809, 6809 programs to PIC

**FULL-SCREEN FLEX TSC XBASIC PROGRAMS**
(with complete cursor control)
DISPLAY GENERATOR/DOCUMENTOR $50
MAILING LIST SYSTEM $100
INVENTORY WITH MRP $100
TABULA RASA SPREADSHEET $100

**DISK UTILITY PROGRAM LIBRARY $50-FLEX**
edit disk sectors, sort directory, maintain master catalog, etc.

**CMODEM TELECOMMUNICATIONS PROGRAM $50-FLEX & OS/9**
menu-driven with terminal mode, file xfer, MODEM7 protocol, etc.

**5.25" SOFT-SECTORED DISKETTES EACH SET OF 50 $75**
DSDD, with Tyvek jackets, hub rings, labels, write-protect tabs

Computer Systems Consultants, Inc.
1454 Latta Lane, Conyers, GA 30207
Telephone Numbers 404-483-1717/4570

Specify Color Computer or other version of programs.
Programs provided in source form on diskette: specify O.S.
Call or write for full catalog and dealer info.
VISA and MASTER CARD accepted; US funds only.
Add 5% for shipping software, but not for diskettes.

FLEX trademark of Technical Systems Consultants.
OS/9 trademark of Microware.

✓223

## F-16 Instrument Flight Simulator

Reviewed in January 1984 Rainbow: ".. this program is the Right Stuff!" Specify 16 or 32/64 K, direct save to disk $19.95 +$1.00 S&H

## TSPOOL

Don't wait for your printer anymore! Tspool allows you to type the next document at the same time your printer is printing the first one. Specifically designed for Telewriter-64 users. Optional descenders included for DMP-100 printers. For 32/64K, disk compatible $24.95 + $1.00 S&H

## DESCENDERS

BACK BY POPULAR DEMAND! User transparent graphic lowercase descenders for LPVII/DMP-100 printers. For use with Basic (16/32/64K) or Telewriter-64 (32/64K) only, disk compatible. $15.95 + $1.00 S&H

## TELEWRITER-64

For your convenience, we offer Telewriter-64 at $49.95 tape or $59.95 disk +$1.00 S&H. In our opinion, this is the BEST word processor you can buy. Save 15% on our TSPOOL or Descenders if you order in combination with Telewriter-64.

Telewriter-64 is a trademark of Cognitec

COD orders gladly accepted, call (813) 321-2840
between 9am & 5pm EST
Sorry we cannot accept credit card orders

KRT Software
P O Box 41395
St Petersburg, Fl 33743

✓395

# !!! FREE !!!

Published Monthly by Computer Publishing Inc., Hixson, TN.
$1.95
Bulk Rate U.S. Postage PAID Chattanooga, TN Permit No. 357
Color Micro Journal
CHECKS /BAS
OS-9 on the COLOR COMPUTER
LINKING LOADER
MICROBOOKS
OS-9 TIPS
COMPUTER OPERATING SYSTEMS
CONVERTING CoCo BASIC TO OS-9 Basic09
THIS 'N THAT
MYDIR An OS-9 Asmb. Lang. "Pipe" Filter
COPY M/L TAPES with this short BASIC Prog

Learn
**HOW** to **USE**
YOUR Color Computer

## TRY ONE ON US
## FREE
## SAMPLE ISSUE
## 1-800-338 6800
MON.-FRI. 9-5 E.S.T.

**Color Micro Journal™**
5900 Cassandra Smith Rd.
Hixson, TN. 37343

### Subscription Rates
12 Issues a Year

USA-$12.50 per year.
Canada & Mexico-$19.50 per year

Surface Foreign-$24.50 per year.
Airmail Foreign-$48.50 per year

TM Color Micro Journal is a trademark of Computer Publishing Inc

✓213

BY BOB JACK

DICTIONARY

# SPELLING EDITOR

If you think an SVP Editor sounds like someone who edits replies to party invitations, you're wrong (that's RSVP editor). SVP stands for Spelling Verifier Program, which appeared in last month's *HOT CoCo* (p. 96). SVP Editor provides a way to manipulate the data files that SVP creates.

### The Basic Program

SVP creates two disk files. SWords are words two to four characters long and LWords are words five to 15 characters long. The editor program lets you print, enter, or delete from either of the two disk files.

The program has some interesting features even if you don't use SVP. It automatically opens and closes the alpha lock for input of lowercase words. Another interesting thing is the way the program configures the printing for five columns of words. Table 1 lists the program's variables.

### Easy Runner

Store SVP, the editor, and the two disk files (SWords and LWords) on one disk so when you finish working with SVP or turn on the computer, all you have to do is type in RUN SVPEDT to get the editor.

Take command of spelling problems with this editor program for your Spelling Verifier Program files.

First, you see the main menu with seven options including print, enter, or delete either of the two disk word files, and end program. The program automatically loops back to the main menu when it completes an option. To get out of the editor and ensure that no disk files are left open, use end program.

### Options

The enter option lets you enter words directly into the two disk word files. While SVP performs this option for you, this is a quicker way of building up the disk-file vocabulary. Use a dictionary or a stenographer's spelling book and choose only familiar words, perhaps 40 or 50 or so per alphabetic character depending on the popularity of the character.

*System Requirements*

**32K RAM**
**Disk Basic**
**One Disk Drive**
**SVP Program**

By doing this with the long words you create a good starting vocabulary for the SVP. Don't bother with the short words as they have a way of sorting themselves out. Usually misspelled words are in the long-word file.

One of the SVP options lets you add temporary word storage to the main disk word files and build the SVP vocabulary. If abbreviations or misspelled words sneak into the disk files, use the editor's delete option. To do this, type in the words the way they are misspelled. Occasionally, use the print option to get a list of words in the disk files, check them, and delete the bad words.

The print option gives a printout of the words in either of the two disk word files so you can see what words are in the vocabulary. Since the printing appears in five columns per printed page, *Program Listing. SVP Editor*

```
10 '
20 ' SVPEDT
30 ' BY
40 ' BOB JACK
50 ' 1983
60 '
70 GOTO 2350
80 DIM W$(100)
90 OPEN "D",#1,"LWORDS"
100 OPEN "D",#2,"SWORDS"
110 CLOSE
120 CLS:PRINT@32*2+7,"SVP EDITOR
"
130 PRINT@32*4,"1)      SHORT WOR
D PRINT"
140 PRINT@32*5,"2)      SHORT WOR
D ENTER"
150 PRINT@32*6,"3)      SHORT WOR
D DELETE"
160 PRINT@32*7,"4)      LONG WORD
 PRINT"
170 PRINT@32*8,"5)      LONG WORD
 ENTER"
180 PRINT@32*9,"6)      LONG WORD
 DELETE"
190 PRINT@32*10,"7)      END PROG
RAM"
200 PRINT@32*12+7,"DO WHICH ONE
?"
210 SOUND 200,3
220 AW$=INKEY$:IF AW$="" THEN 22
0
230 AW=VAL(AW$)
240 IF AW<1 OR AW>7 THEN 220
250 ON AW GOTO 870,460,1050,1350
,1930,1540,2340
260 SL=1:SW=0
270 FOR X=1 TO 100:W$(X)="":NEXT
 X
280 SOUND 200,3
290 POKE 282,0:INPUT "      ";W1$
:POKE 282,1
300 IF W1$="" THEN RETURN
310 WL=LEN(W1$)
320 IF WL<LI OR WL>HI THEN PRINT
 TAB(5);"WHAT ???":GOTO 280
330 K=1:H=SL:L=1:S=INT(H/2) :SW=
1
340 IF S<1 THEN 410
350 IF W1$=W$(S) THEN 280
360 IF W1$<W$(S) THEN H=S ELSE L
=S
370 S=INT((H-L)/2)+L
380 IF H-L>1 THEN 350
390 IF W1$=W$(H) OR W1$=W$(L) TH
EN 280
400 IF W$(L)<W1$ THEN K=H ELSE K
=L
410 IF SL=K THEN 430
420 FOR J=SL TO K STEP -1:W$(J)=
W$(J-1):NEXT J
430 W$(K)=W1$:SL=SL+1
440 IF SL>99 THEN RETURN
450 GOTO 280
460 CLS:PRINT TAB(5);"SHORT WORD
 ENTER"
470 PRINT TAB(5);"NO MORE THEN 4
 LETTERS"
480 PRINT TAB(5);"AT LEAST 2 LET
TERS"
490 PRINT
500 LI=2:HI=4
510 GOSUB 260
520 IF SW=0 THEN 120
530 CT=0:OL$=""
540 CLS
550 OPEN "I",#1,"SWORDS"
560 OPEN "O",#2,"SWBKUP"
570 X=1
580 FOR I=1 TO 1000
590 IF EOF(1) THEN 770
600 INPUT #1,A$
610 IF W$(X)="" THEN 710
620 IF W$(X)=A$ THEN 760
630 IF W$(X)>A$ THEN 710
640 IF W$(X)=OL$ THEN 690
650 PRINT #2,W$(X)
660 CT=CT+1
670 PRINT TAB(5);W$(X)
680 OL$=W$(X)
690 X=X+1
700 GOTO 610
710 IF A$=OL$ THEN 760
720 PRINT #2,A$
730 CT=CT+1
740 PRINT TAB(5);A$
750 OL$=A$
760 NEXT I
770 IF W$(X)="" THEN 850
780 IF W$(X)=OL$ THEN 830
790 PRINT #2,W$(X)
800 CT=CT+1
810 PRINT TAB(5);W$(X)
820 OL$=W$(X)
830 X=X+1
840 GOTO 770
850 CLOSE
860 GOTO 1280
870 CLS:PRINT@32*7+7,"SHORT WORD
 PRINT"
880 POKE &H009B,80
890 CT=0
900 OPEN "I",#1,"SWORDS/DAT"
910 FOR X=1 TO 2000
920 IF EOF(1) THEN 970
930 INPUT #1,A$
940 CT=CT+1
950 PRINT#-2,A$,;
960 NEXT X
970 CLOSE
980 POKE &H009B,132
990 PRINT#-2,""
1000 CLS:PRINT@32*7+5,CT;" SHORT
 WORDS"
1010 SOUND 200,3
1020 PRINT@32*15+3,"PRESS ANY KE
Y TO CONTINUE";
1030 AW$=INKEY$:IF AW$="" THEN 1
030
1040 GOTO 120
1050 CLS:PRINT TAB(5);"SHORT WOR
D DELETE"
1060 PRINT TAB(5);"NO MORE THEN
4 LETTERS"
1070 PRINT TAB(5);"AT LEAST 2 LE
TTERS"
1080 PRINT
1090 LI=2:HI=4
1100 GOSUB 260
1110 IF SW=0 THEN 120
1120 CT=0:OL$="":S=1:SL=SL-1
1130 CLS
1140 OPEN "I",#1,"SWORDS/DAT"
1150 OPEN "O",#2,"SWBKUP/DAT"
1160 FOR X=1 TO 2000
1170 IF EOF(1) THEN 1270
1180 INPUT #1,A$
1190 IF A$=W$(S) THEN 1260
1200 IF A$>W$(S) AND S<SL THEN S
=S+1:GOTO 1190
1210 IF A$=OL$ THEN 1260
1220 PRINT #2,A$
1230 CT=CT+1
1240 OL$=A$
1250 PRINT TAB(5);A$
1260 NEXT X
1270 CLOSE
1280 CLS:PRINT@32*7+5,CT;" SHORT
 WORDS"
1290 SOUND 200,3
```

*Listing continued*

*"You do not have to enter words in alphabetical order since they are arranged that way automatically."*

you can easily use the delete option to remove words from the file.

The enter and delete options use the same subroutine to get their working words. You do not have to enter words in alphabetical order since they are arranged that way automatically. The program responds with "What ???" to words of the wrong length. Enter a black line to stop word entry. If you use the enter option, be careful in your spelling because the only way to remove a misspelled word is with the delete option.

The editor operates with a single disk drive and 32K of memory and the SVP requires dual disks and 32K. If you would like to use SVP with one disk drive, change line 300 from:

300 OPEN "I",#1,F$+":1"

to:

300 OPEN "I",#1,F$

| | |
|---|---|
| A$ | Disk file input or output. |
| AW | Value of answer. |
| AW$ | Answer input. |
| B$ | Disk file input or output. |
| CT | Record count. |
| H | High position in sort. |
| HI | Maximum word length. |
| I | FOR...NEXT variable. |
| J | FOR...NEXT variable. |
| K | Ending position in sort. |
| L | Low position in sort. |
| LI | Minimum word length. |
| LWBKUP | Long words backup disk file. |
| LWORDS | Long words disk file. |
| OL$ | Removal of duplicate words. |
| S | Center position in sort. |
| SL | Number of words in working word variable + 1. |
| SW | 0 = no words in working word variable. |
| SWBKUP | Short word backup disk file. |
| SWORDS | Short words disk file. |
| W$(1-100) | Working word file. |
| W1$ | String input. |
| WL | Word length. |
| X | FOR...NEXT variable. |
| Y | FOR...NEXT variable. |

*Table. Variable Description*

You must also place your ASCII file to be verified on the same disk as the spelling package. If you find improvements on these programs, please contact me at the following address. ■

---

*Bob Jack, 8371 White Road, Burbank, OH 44214.*

# Survival Kit for the 80's

80 micro
Build It Yourself
Model III CP/M
For only $5!
Protect Your Micro
From Prying Eyes
Your TRS-80 Meets
The Real World
How to Become
A Hardware Hacker
AIDS-III

## Don't program without it.

Technology in transition. Changes in hardware, software, disk systems, printers and modems—the list goes on. It's all happening so fast. How do you survive in the fast-paced computer world?

With the help of 80 MICRO, the largest single source of information for your TRS-80*. It's required reading for those who want to discover:

- •TUTORIALS—To help you become a better programmer whether you're a beginner or an old hand.
- •UTILITY PROGRAMS—Designed to let you get the most from your system.
- •NEW APPLICATIONS—In science, business, and the home.
- •NEW PRODUCT REVIEWS—Straightforward evaluations of state-of-the-art hardware and software that give you the facts before you buy.
- •NEW GAMES—Scores of innovative new games offering a real challenge and lots of fun.

With 80 MICRO in hand you won't just survive. You'll prosper in the Age of the Computer.

Subscribe today. Use the coupon below, the attached card, or call toll free **1-800-258-5473. In NH call 1-924-9471.**

80 micro
THE MODEL 2000

**Yes,** I want to subscribe to **80 MICRO**. Send me 12 issues for only $24.97**. I understand that with payment enclosed or credit card order I will receive a free issue making a total of 13 issues for $24.97.

☐CHECK/MO ☐MC
☐VISA ☐AE ☐BILL ME

Card#____________________

Signature______________ Exp. Date______

Name____________________

Address____________________

City____________ State______ Zip______

*Canada & Mexico $27.97/1 yr. only US Funds.*
*Foreign Surface $44.97/1 yr. only US Funds drawn on US Bank.*
*Please allow 6-8 weeks for delivery.*

*TRS-80 is a trademark of Radio Shack, a division of Tandy Corp.
**This price voids all previous offers.

346F4

**80 MICRO • PO Box 981 • Farmingdale, NY 11737**

*Listing continued*

```
1300 PRINT@32*15+3,"PRESS ANY KE
Y TO CONTINUE";
1310 AW$=INKEY$:IF AW$="" THEN 1
310
1320 KILL "SWORDS/DAT"
1330 RENAME "SWBKUP/DAT" TO "SWO
RDS/DAT"
1340 GOTO 120
1350 CLS:PRINT@32*7+7,"LONG WORD
 PRINT"
1360 POKE &H009B,80
1370 CT=0
1380 OPEN"D",#1,"LWORDS/DAT",15
1390 FIELD #1,15 AS A$
1400 IF LOF(1)=0 THEN 1460
1410 FOR X=1 TO LOF(1)
1420 GET #1,X
1430 PRINT#-2,A$,;
1440 CT=CT+1
1450 NEXT X
1460 CLOSE
1470 POKE &H009B,132
1480 PRINT#-2,""
1490 CLS:PRINT@32*7+5,CT-1;" LON
G WORDS"
1500 SOUND 200,3
1510 PRINT@32*15+3,"PRESS ANY KE
Y TO CONTINUE";
1520 AW$=INKEY$:IF AW$="" THEN 1
520
1530 GOTO 120
1540 CLS:PRINT TAB(5);"LONG WORD
 DELETE"
1550 PRINT TAB(5);"NO MORE THEN
15 LETTERS"
1560 PRINT TAB(5);"AT LEAST 5 LE
TTERS"
1570 PRINT
1580 LI=5:HI=15
1590 GOSUB 260
1600 IF SW=0 THEN 120
1610 FOR X=1 TO SL
1620 WL=LEN(W$(X))
1630 WL=15-WL
1640 W$(X)= W$(X)+STRING$(WL," "
)
1650 NEXT X
1660 CLS:OL$=""
1670 OPEN"D",#1,"LWORDS/DAT",15
1680 OPEN"D",#2,"LWBKUP/DAT",15
1690 FIELD #1,15 AS A$
1700 FIELD #2,15 AS B$
1710 Y=1:S=1:SL=SL-1
1720 FOR X=1 TO LOF(1)
1730 GET #1,X
1740 IF A$=W$(S) THEN 1820
1750 IF A$>W$(S) AND S<SL THEN S
=S+1:GOTO 1740
1760 IF A$=OL$ THEN 1820
1770 LSET B$=A$
1780 PUT #2,Y
1790 Y=Y+1
1800 OL$=A$
1810 PRINT TAB(5);A$
1820 NEXT X
1830 LSET B$=STR$(Y)
1840 PUT #2,1
1850 CLOSE
1860 CLS:PRINT@32*7+5,Y-2;" LONG
 WORDS"
1870 PRINT@32*15+3,"PRESS ANY KE
Y TO CONTINUE";
1880 SOUND 200,3
1890 AW$=INKEY$:IF AW$="" THEN 1
890
1900 KILL "LWORDS/DAT"
1910 RENAME "LWBKUP/DAT" TO "LWO
RDS/DAT"
1920 GOTO 120
1930 CLS:PRINT TAB(5);"LONG WORD
 ENTER"
1940 PRINT TAB(5);"NO MORE THEN
15 LETTERS"
1950 PRINT TAB(5);"AT LEAST 5 LE
TTERS"
1960 PRINT
1970 LI=5:HI=15
1980 GOSUB 260
1990 IF SW=0 THEN 120
2000 CLS:OL$=""
2010 OPEN "D",#1,"LWORDS",15
2020 OPEN "D",#2,"LWBKUP",15
2030 FIELD #1,15 AS A$
2040 FIELD #2,15 AS B$
2050 X=1:Y=1
2060 IF LOF(1)=0 THEN Y=2:GOTO 2
260
2070 FOR I=1 TO LOF(1)
2080 GET #1,I
2090 IF W$(X)="" THEN 2190
2100 IF W$(X)=A$ THEN 2250
2110 IF W$(X)>A$ THEN 2190
2120 IF W$(X)=OL$ THEN X=X+1:GOT
O 2090
2130 LSET B$=W$(X)
2140 PUT #2,Y
2150 PRINT TAB(5);B$
2160 OL$=B$
2170 X=X+1:Y=Y+1
2180 GOTO 2090
2190 IF A$=OL$ THEN 2250
2200 LSET B$=A$
2210 PUT #2,Y
2220 PRINT TAB(5);B$
2230 OL$=B$
2240 Y=Y+1
2250 NEXT I
2260 IF W$(X)="" THEN 1830
2270 IF W$(X)=OL$ THEN X=X+1:GOT
O 2260
2280 LSET B$=W$(X)
2290 PUT #2,Y
2300 PRINT TAB(5);B$
2310 OL$=B$
2320 X=X+1:Y=Y+1
2330 GOTO 2260
2340 CLOSE:CLS:END
2350 PCLEAR 1
2360 FILES 3,3000
2370 CLEAR 12000
2380 GOTO 80
```

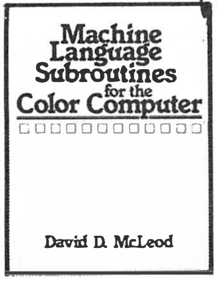
*END*

BOOKS — Wayne Green Books — BOOKS

SVC
APPLE
MICROCOMPUTER SYSTEM REFERENCE CARDS

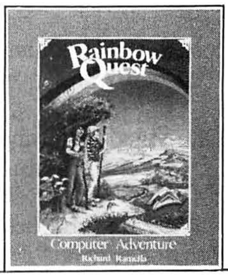
**Nanos System Reference Cards**

*No more flipping through the Color Computer manuals to find information you need. Nanos System Reference cards are pocket-sized summaries for your quick, easy reference. Find such information as BASIC commands and instructions, ROM routines, reserved words, I/O instructions, hex conversions, screen line layout, and anything else you need to know to program your machine.* ***TRS-80 Color BASIC and Extended FC1006 $4.95***



**Machine-Language Subroutines for the Color Computer**

*A book of useful machine-language routines for use in your Color Computer programs. Both ROM and RAM subroutines are included, and all programs are on the cassette that comes with the book. The ROM subroutines come from the standard BASIC ROM and can be used with BASIC 1.0 or BASIC 1.1. The RAM subroutines are a collection of the author's routines. For each routine, you get entry requirements, exit conditions, error interpretation and program listings. Numeric conversions, data processing, keyboard input, text screen output, text output using high-resolution graphics, tape/disk I/O and multiple-precision routines are discussed at length.*
***$29.95 CC7404 300 pp.***



**Rainbow Quest for the Color Computer**

*A computer fantasy for young Color Computer users.* ***Rainbow Quest*** *is an adventure that combines fiction and programs. Readers must cross the planet Rainbow and master a series of challenges to succeed on the Quest. Each challenge is a program on cassette. Included are arcade games, puzzles, and mazes. Book and cassette sold together.* ***$24.97 CC7391 128 pp.***

✓331

*For credit card orders, call* ***toll-free, 1-800-258-5473.*** *Or send your order on a separate piece of paper to:* ***Wayne Green Books, Retail Sales, Peterborough, NH 03458.*** *Be sure to include the book title, order number, and price. Postage and handling is $1.50 for the first book, $1.00 for each additional book. Foreign air mail is $10.00 per book. Check, money order, or complete credit card information must accompany your order. If you have questions about your order, write customer service at the above address. Orders payable in U.S. dollars only.*

# The Educated Guest

## ASSESSING EDUCATIONAL SOFTWARE

*by Charles Santee*

Since one of my goals in The Educated Guest is to help you become a more informed consumer, this month I take a look at the software review process.

The Educational Products Information Exchange and Consumer's Union (EPIE) is an extensive review service offering a comprehensive service for schools. This is my target.

The EPIE's format is neatly organized in file-box form, and it consists of reports and short evaluations, very few of which, unfortunately, deal with software for the Color Computer. Despite its limitations, however, this service offers the type of comprehensive evaluation I would like to see more often. The reviews also point out deficiencies in existing software that all vendors and manufacturers need to be aware of.

Teams of evaluators with technical and education backgrounds review products using a scale of 80 items. Each evaluation is a written description (two or more pages) allowing direct comparison with similar products. The evaluation criteria is rigorous and fair, though it occasionally favors one type of software over another.

Evaluation of Instructional and Software Design is broken into four major areas: goals and objectives; content; methods and approaches; and evaluation and management.

In the evaluation and management sections you will find tests, branching, and record-keeping strategies. Since educational products designed for the home do not use a strategy for evaluation and management, they might be at a disadvantage when evaluated by this process.

Each evaluation provides two numeric scores. The overall rating of instructional design and the overall rating of software design are done on a scale of 1-10. I examined reviews of all software that scored 6 or above in one or more of the numeric ratings, and, interestingly, some of these products lacked goals and objectives or evaluation and management and still obtained high overall ratings. It appears the ultimate worth of an EPIE evaluated product is not simply a sum of its parts.

A careful look at the weaknesses in these selected products was helpful in establishing some guidelines for improvement.

I propose the following:

- More software should include behavioral objectives stated in terms of expected learner outcomes.

*I picked out the best*
*And discarded the rest;*
*From the best of the rest*
*I discarded the best;*
*Then what was left...*
*Perhaps the WORST of the BEST?*

- More software should include evidence of development. Specifically, what evidence exists that the program has been used successfully.
- More software should include noncomputerized support material or a method of integrating the program into a traditional educational setting.
- More software should include information that guides the learning process when a student selects incorrect responses.
- More software should include a record-keeping or student-management system.

This month's programs deal with the last item. Faithful column readers will notice that the content of Program Listing 1 is the same as the one presented in the February column. The method of presentation, however, is quite different. Quiz provides a question-and-answer format and records student responses on a disk.

instant CoCo

You can use it without disk, but the record-keeping function is not available. Program Listing 2, Retrieve, calls back the records of a student's responses and prepares a written report of his progress and a simple item analysis. (Cassette users can skip this one.)

### How to Use the Quiz Program

If you do not have disk, run the program and quiz at will.

If you do have disk, type PCLEAR1, then press the enter key. The program asks you to enter the name of a student file. Type and enter eight or fewer letters, using a different file name for each student who uses the program.

The program verifies the file. If the file does not exist, it opens a blank file for future use. Press enter to begin. If this is a student's first time with the program, or if you want him to start from scratch, press enter and quiz at will.

The program selects five questions and gives them one at a time, with one to four possible responses, and the student presses a number for the answer. When he finishes, the student sees a summary of progress (the percent correct) and indicates whether or not he wants to continue. If he chooses to continue, the program selects five more questions.

Questions are selected in a prescribed order, starting with those previously answered incorrectly. It selects the remaining questions from any not yet used. If all items have been used, the program randomly selects ones from a pool of correctly answered questions from previous attempts.

Should the student choose not to

### *System Requirements*

**16K RAM**
**Extended Color Basic**
**Disk Drive (optional)**
**Printer (optional)**

continue, the program records (on disk) the most recent response pattern for all items and saves it as a single string (SM$). When the program begins, it initializes the string to a string of asterisks equal in length to the number of items included in the DATA statements.

Each time a student answers correctly an asterisk is changed to a plus sign. Each time an item is answered incorrectly, an asterisk is changed to the number one. For example, the string SM$ = "+1+1****" denotes that there are eight items in the DATA

```
10 CLEAR 1000
15 IF PEEK(188)=6 THEN 70
20 CLS:INPUT"STUDENT FILE";NF$:N
F=0:IF LEN(NF$)<8 THEN NF$=NF$+S
TRING$(8-LEN(NF$)," ")
30 FOR X=3 TO 11:DSKI$ 0,17,X,A$
,B$
40 IF INSTR(A$,NF$)<>0 THEN NF=1
 ELSE IF INSTR(B$,NF$)<>0 THEN N
F=1
50 NEXT X
60 IF NF=0 THEN OPEN"O",#1,NF$:C
LOSE#1:CLS:PRINT@326,CHR$(191);"
new";CHR$(175);"file";CHR$(191):
PLAY"T4L4CEGEC"
70 DIM CC$(20),MM$(20)
80 CLS:F=1:L=4:I=2:R=1:NI=0:Q=5
90 READ CC$:IF CC$<>"*" THEN TI=
TI+1:CC$(TI)=CC$:READ MM$(TI):GO
TO 90 ELSE SM$=STRING$(TI,"*")
95 IF PEEK(188)=6 THEN 170
100 CLS:PRINT@326,"PRESS enter T
O BEGIN";:INPUT  D$:IF D$<>"T" A
ND D$<>"t" THEN 170
110 INPUT "STUDENT FILE";NF$
120 IF LEN(NF$)<8 THEN NF$=NF$+S
TRING$(8-LEN(NF$)," ")
130 OPEN"I",#1,NF$
140 IF EOF(1) THEN 160
150 INPUT#1,SM$:GOTO 140
160 CLOSE #1
170 GOSUB 180:GOTO 190
180 CLS:FOR A=1 TO 4:PRINT @A*96
+32,STRING$(32,131):POKE 1056+A*
96,ASC(RIGHT$(STR$(A),1)):NEXT:R
ETURN
190 NS=0:PL$="":SL=0
200 NS=NS+1:IF MID$(SM$,NS,1)="+
" THEN PL$=PL$+RIGHT$(STR$(NS),2
) ELSE SL=SL+1:C$(SL)=CC$(NS):M$
(SL)=MM$(NS):CC(SL)=NS
210 IF SL=Q THEN 270
220 IF NS<TI THEN 200
230 FOR A=SL+1 TO Q
240 L=INT(LEN(PL$)/2)
250 LL=RND(L)*2-1:VL=VAL(MID$(PL
$,LL,2)):M$(A)=MM$(VL):C$(A)=CC$
(VL):CC(A)=VL
260 MID$(PL$,VL,2)=RIGHT$(PL$,2)
:PL$=LEFT$(PL$,LEN(PL$)-2):NEXT
A
270 Q=5:M=0:T=0:S=Q
280 MN=INSTR(SM$,"1"):IF MN<>0 T
HEN MID$(SM$,MN,1)="*":GOTO 280
290 FOR N= 1 TO Q
300 P=RND(S)
310 PRINT@0,STRING$(128," ");:PR
INT@0,"";:PR$=C$(P):GOSUB 740
320 GOSUB 470
330 C$(P)=C$(S):M$(P)=M$(S):CC(P
)=CC(S):S=S-1
340 NEXT N
350 PC=INT(M/T*100)
360 PLAY "O3T6L6FGAGFCEFP4O4FGAG
FCEG"
370 CLS:PRINT@256,PC;"% CORRECT
ON THE FIRST TRY":PRINT:PRINT"
TRY AGAIN (Y/N)?";
380 X$=INKEY$:IF X$="N" THEN GOT
O 415 ELSE IF X$<>"Y" THEN 380
390 IF INSTR(SM$,"*")<>0 THEN GO
SUB 180:GOTO 190
400 IF INSTR(SM$,"1")<>0 THEN GO
SUB 180:GOTO 190
410  CLS4:PRINT@128,"YOU HAVE FI
NSIHED ALL THE        QUESTIONS I
N THIS PROGRAM       VERY GOOD J
OB                     ";:PLAY "T4L
4O3C
EGO2L2CO3CO2C"
415 IF PEEK(188)=6 THEN END
420 OPEN"I",#1,NF$:NN=0
430 IF EOF(1) THEN CLOSE#1:GOTO
450
440 NN=NN+1:INPUT #1,SM$(NN):GOT
O 430
450 OPEN"O",#1,NF$:IF SM$(1)<>""
 THEN FOR A=1 TO NN:PRINT#1,SM$(
A):NEXT A
460 PRINT#1,SM$:CLOSE#1:END
470 LS$=M$(P)
480 NA=1
490 LS=INSTR(LS$,"/"):IF LS=0 TH
EN  A$(NA)=LS$:GOTO 510
500 A$(NA)=LEFT$(LS$,LS-1):LS$=R
IGHT$(LS$,LEN(LS$)-LS):NA=NA+1:G
OTO 490
510 SL=0
520 FOR C=NA TO 1 STEP -1
530 Z=RND(C):IF Z=1 AND SL=0 THE
N CA$=RIGHT$(STR$(C),1):SL=1:CA=
C
540 T$=A$(C):A$(C)=A$(Z):A$(Z)=T
$
550 NEXT C
560 FOR C=1 TO NA
570 PR$=A$(C):PRINT@C*96+64,"";:
GOSUB 740
580 NEXT C
590 FT=1
600 REM
610 X$=INKEY$:IF X$="" THEN 610
ELSE IF X$<"1" OR X$>"4" THEN PR
INT@132,"PRESS number TO ANSWER"
;:PLAY"O1T4L2GC":PRINT@132,"pres
s NU
MBER to answer";:PLAY"O1T4L2GC":
PRINT@132,STRING$(24,131);:GOTO
610
620 IF X$<>CA$ THEN FT=0:PRINT@1
40,"try again";:PLAY"T4L4O1GCP1"
:PRINT@140,STRING$(20,131);:IF V
AL(MID$(SM$,CC(P),1))<1 THEN MID
$(SM
$,CC(P),1)="1":GOTO 600 ELSE GOT
O 600
630 T=T+1:M=M+FT:IF VAL(MID$(SM$
,CC(P),1))<1 THEN MID$(SM$,CC(P)
,1)="+"
640 FOR C=1 TO 4
650 IF C<>CA THEN PRINT@C*96+64,
STRING$(63,32);
660 NEXT C
670 FOR B=1 TO 2
680 PRINT@CA*96+32,"";:IF B=1 TH
EN PRINT STRING$(32,128);:POKE C
A*96+1056,ASC(RIGHT$(STR$(CA),1)
)
690 FOR E=1 TO 64:LL=1087+96*CA+
E:POKE LL,PEEK(LL)+64*((PEEK(LL)
>64)*2+1):NEXT E
700 PLAY "O2L4T50CEDFGAB"
710 NEXT B:PLAY"P1O3T4L8CEG"
720 GOSUB 180
730 RETURN
740 PP=30
750 IF LEFT$(PR$,1)=" " THEN PR$
=RIGHT$(PR$,LEN(PR$)-1):GOTO750
760 IF LEN(PR$)<30 THEN PRINTTAB
(1);PR$;:RETURN
770 IF MID$(PR$,PP,1)<>" " THEN
PP=PP-1:GOTO 770
780 PRINTTAB(1);LEFT$(PR$,PP):PR
$=RIGHT$(PR$,LEN(PR$)-PP):PP=30:
GOTO 750
790 RETURN
800 DATA "A noun IS A WORD USED
TO NAME A PERSON, PLACE, THING,
OR IDEA.  WHICH PHRASE SHOWS THE
 NOUN IN BLACK?"
810 DATA "THE man WAS SMALL/the
MAN WAS SMALL/THE MAN was SMALL/
THE MAN WAS small"
820 DATA "A pronoun IS A WORD US
ED IN PLACE OF ONE OR MORE NOUNS
.  WHICH PHRASE SHOWS THE PRONOU
N IN BLACK?"
830 DATA "he IS GOING TO THE SHO
W/HE is GOING TO THE SHOW/HE IS
GOING to THEN SHOW/HE IS GOING T
O THE show"
840 DATA "AN adjective IS A WORD
 USED TO MODIFY A NOUN OR PRONOU
N.  WHICH PHRASE SHOWS AN ADJECT
IVE IN BLACK?"
850 DATA "SHE IS A tall GIRL/she
 IS A TALL GIRL/SHE is A TALL GI
RL/SHE IS a TALL GIRL"
860 DATA "A verb IS A WORD THAT
SHOWS ACTION OR HELPS TO MAKE A
STATEMENT.  WHICH PHRASE SHOWS A
 VERB IN BLACK?"
870 DATA "HE hit THE BALL/he HIT
 THE BALL/HE HIT the BALL/HE HIT
 THE ball"
880 DATA "WHICH PHRASE SHOWS A n
oun IN BLACK?"
890 DATA "I LIVE IN THE city/the
 WOMAN WAS HAPPY/FIND the BUILDI
NG/IT is MY BOOK"
900 DATA "WHICH PHRASE SHOWS A p
ronoun IN BLACK?"
910 DATA "he IS THE ONE I SAW/CA
N SHE do IT/WE ARE together/YOU
CAN do IT"
920 DATA "WHICH PHRASE SHOWS THE
 verb IN BLACK?"
930 DATA "WILL YOU play WITH ME/
you CAN HIT THE BALL/HE CAN RUN
very FAST/HE IS A happy MAN"
940 DATA "WHICH PHRASE SHOWS THE
 adjective IN BLACK?"
950 DATA "THEY HAVE blue EYES/SH
E is SMALL/THE MAN IS very LARGE
/you CAN FIND THE CORRECT ANSWER
"
960 DATA "WHICH PHRASE SHOWS A n
oun IN BLACK?"
970 DATA "THE MAN HAD courage/BE
AUTY is ONLY SKIN DEEP/join THE
CROWD/HE IS A courageous PERSON
"
980 DATA "WHICH PHRASE SHOWS AN
pronoun IN BLACK?"
990 DATA "THIS IS his PEN/THAT I
S NOT very FUNNY/CAN YOU see HIM
/try TO WORK HARDER"
1000 DATA "WHICH PHRASE SHOWS TH
E adjective IN BLACK?"
1010 DATA "some PEOPLE HAVE HOBI
ES/ALL cats EAT FOOD/CAN YOU do
IT/use YOUR IMMAGINATION"
1020 DATA "WHICH PHRASE SHOWS TH
E verb IN BLACK?"
1030 DATA "I am VERY HAPPY/you W
ILL FIND IT/where IS THE GOLD/TH
AT IS correct"
1040 DATA "*"
```

*Program Listing 1. Quiz*

statements. Items 1 and 3 were answered correctly. Items 2 and 4 were answered incorrectly. The remaining items have not been attempted.

Suppose you had previously used the program with a student and you want to pick up where you left off. Run the program. When the program states "Press enter to begin," press T (for teacher) and enter.

You are asked to enter a student file. Type and enter the eight or fewer letters you used before. The program loads the last response pattern and proceeds from where it left off.

**How to Use the Retrieve Program**

After you run the program you see a list of all data files created on the disk. (Make sure the correct disk is in drive 0 before typing RUN.) You can select as many of these files as desired for your analysis. Select the number in front of each and press enter.

As you enter each number a red square marks your selection. Repeat this process for all the files you want. When you have finished, press enter without typing a number. The program then asks you to verify that you have made the correct selections. Press Y for yes or N for no.

Next, press P to send output to the printer, or press S to send output to the screen. After you press S the first student file is loaded and you will see:

```
THE STUDENT'S NAME (FILE NAME)
ITEMS RIGHT
ITEMS WRONG
ITEMS NOT TRIED
```

To see more information press any key except break. The information is repeated for each separate setting that the same student used. The program

```
10 CLEAR 1000
20 DIM CC$(20),MM$(20),NF$(20),N
R(20),NW(20)
30 READ CC$:IF CC$<>"*" THEN TI=
TI+1:CC$(TI)=CC$:READ MM$(TI):GO
TO 30
35 CLS
40 FOR X=3 TO 11
50 DSKI$ 0,17,X,A$,B$
60 C$=A$+LEFT$(B$,127)
70 FOR N=0 TO 7
80 NAM$=MID$(C$,N*32+1,8)
90 EXT$=MID$(C$,9+N*32,3)
100 IF EXT$="DAT" AND LEFT$(NAM$
,1)<>CHR$(0) THEN NF$(NN+1)=NAM$
:PRINT@NN*16,NN+1;NF$(NN+1):NN=N
N+1
110 NEXT N,X
120 PRINT STRING$(32,"-");
125 SL$="":FOR A=0 TO NN:PRINT@A
*16,CHR$(32);:NEXT
130 L=INT((NN+4)/2)*32:PRINT@L,S
TRING$(64,32);:PLAY"T4L16C":PRIN
T@L,"SELECT NUMBER THEN PRESS en
ter  PRESS enter WHEN FINISHED";
:INP
UT NM$
140 V=VAL(NM$):IF V=0 THEN 300
145 IF V>NN THEN 130
150 PRINT@((V-1)*16),CHR$(191);
160 NM$="/"+NM$:IF INSTR(SL$,NM$
)<>0 THEN 130
170 SL$=SL$+NM$:GOTO 130
300 PRINT@L,STRING$(64,32);:PRIN
T@L,"HAVE YOU ENTERED CORRECTLY
     PRESS y FOR YES - n FOR NO
";
310 X$=INKEY$:IF X$="N" OR X$="n
" THEN 125 ELSE IF X$<>"Y" AND X
$<>"y" THEN 310
312 PRINT@L,STRING$(64,32);:PRIN
T@L,"PRESS p FOR PRINTER
             s FOR SCREEN";
314 P$=INKEY$:IF P$="" THEN 314
ELSE IF INSTR("PpSs",P$)=0 THEN
314
320 K=1
330 K=INSTR(K,SL$,"/"):IF K=0 TH
EN 400
340 VL=VAL(RIGHT$(SL$,LEN(SL$)-K
)):K=K+1
350 OPEN"I",#1,NF$(VL)
360 IF EOF(1) THEN CLOSE#1:GOTO
330
370 INPUT#1,SM$
380 GOSUB 600
390 GOTO 360
400 ON INSTR("pPSs",P$) GOTO 410
,410,500,500
410 FOR A=1 TO LEN(SM$)
420 PRINT#-2:PRINT#-2,"ITEM # ";
A;"    TOTAL RIGHT = ";NR(A);"
  TOTAL WRONG = ";NW(A)
430 PRINT#-2,STRING$(10,".")
450 PRINT#-2,CC$(A):PRINT#-2,MM$
(A)
460 NEXT A
500 CLS
505 PRINT"#";TAB(8);"RIGHT";TAB(
16);"WRONG"
510 FOR A=1 TO LEN(SM$)
520 PRINTA;TAB(8);NR(A);TAB(16);
NW(A)
530 IF A/10=INT(A/10) THEN GOSUB
 580
540 NEXT A
550 GOSUB 580:END
580 PRINT:PRINT"PRESS KEY TO CON
TINUE"
590 X$=INKEY$:IF X$="" THEN590
592 CLS:PRINT"#";TAB(8);"RIGHT";
TAB(16);"WRONG":RETURN
600 CT$="":WR$="":NT$=""
601 FOR A=1 TO LEN(SM$)
602 IF MID$(SM$,A,1)="+" THEN CT
$=CT$+STR$(A):NR(A)=NR(A)+1
603 IF MID$(SM$,A,1)="1" THEN WR
$=WR$+STR$(A):NW(A)=NW(A)+1
605 IF MID$(SM$,A,1)="*" THEN NT
$=NT$+STR$(A)
610 NEXT A
620 ON INSTR("PpSs",P$) GOTO 630
,630,650,650
630 PRINT#-2:PRINT#-2,NF$(VL)
632 PRINT#-2,"ITEM CORRECT = ";C
T$
634 PRINT#-2,"ITEMS WRONG = ";WR
$
636 PRINT#-2,"ITEMS NOT TRIED =
";NT$
638 RETURN
650 CLS:PRINTNF$(VL)
652 PRINT:PRINT"ITEMS WRONG = ":
PRINTWR$
654 PRINT"ITEMS RIGHT = ":PRINTC
T$
656 PRINT"ITEMS NOT TRIED = ":PR
INTNT$
670 PRINT:PRINT"press key to con
tinue"
680 X$=INKEY$:IF X$="" THEN 680
682 RETURN
700 DATA "A noun IS A WORD USED
TO TAME A PRESON, PLACE, THING,
OR IDEA.  WHICH PHRASE SHOWS THE
 NOUN IN BLACK?"
710 DATA "THE man WAS SMALL/the
MAN WAS SMALL/THE MAN was SMALL/
THE MAN WAS small"
720 DATA "A pronoun IS A WORD US
ED IN PLACE OF ONE OR MORE NOUNS
.  WHICH PHRASE SHOWS THE PRONOU
N IN BLACK?"
730 DATA "he IS GOING TO THE SHO
W/HE is GOING TO THE SHOW/HE IS
GOING to THEN SHOW/HE IS GOING T
O THE show"
740 DATA "AN adjective IS A WORD
 USED TO MODIFY A NOUN OR PRONOU
N.  WHICH PHRASE SHOWS AN ADJECT
IVE IN BLACK?"
750 DATA "SHE IS A tall GIRL/she
 IS A TALL GIRL/SHE is A TALL GI
RL/SHE IS a TALL GIRL"
760 DATA "A verb IS A WORD THAT
SHOWS ACTION OR HELPS TO MAKE A
STATEMENT.  WHICH PHRASE SHOWS A
 VERB IN BLACK?"
770 DATA "HE hit THE BALL/he HIT
 THE BALL/HE HIT the BALL/HE HIT
 THE ball"
780 DATA "WHICH PHRASE SHOWS A n
oun IN BLACK?"
790 DATA "I LIVE IN THE city/the
 WOMAN WAS HAPPY/FIND the BUILDI
NG/IT is MY BOOK"
800 DATA "WHICH PHRASE SHOWS A p
ronounb IN BLACK?"
810 DATA "he IS THE ONE I SAW/CA
N SHE do IT/WE ARE together/YOU
CAN do IT"
820 DATA "WHICH PHRASE SHOWS THE
 verb IN BLACK?"
830 DATA "WILL YOU play WITH ME/
you CAN HIT THE BALL/HE CAN RUN
very FAST/HE IS A happy MAN"
840 DATA "WHICH PHRASE SHOWS THE
 adjective IN BLACK?"
850 DATA "THEY HAVE blue EYES/SH
E is SMALL/THE MAN IS very LARGE
/you CAN FIND THE CORRECT ANSWER
"
860 DATA "WHICH PHRASE SHOWS A n
oun IN BLACK?"
870 DATA "THE MAN HAD courage/BE
AUTY is ONLY SKIN DEEP/join THE
CROWD/HE IS A courageous PERSON
"
880 DATA "WHICH PHRASE SHOWS AN
pronoun IN BLACK?"
890 DATA "THIS IS his PEN/THAT I
S NOT very FUNNY/CAN YOU see HIM
/try TO WORK HARDER"
900 DATA "WHICH PHRASE SHOWS THE
 adjective IN BLACK?"
910 DATA "some PEOPLE HAVE HOBIE
S/ALL cats EAT FOOD/CAN YOU do I
T/use YOUR IMMAGINATION"
920 DATA "WHICH PHRASE SHOWS THE
 verb IN BLACK?"
930 DATA "I am VERY HAPPY/you WI
LL FIND IT/where IS THE GOLD/THA
T IS correct"
940 DATA "*"
```

*Program Listing 2. Retrieve*

loads and displays information for the next student, and then gives an item analysis. This lists the total number of correct and incorrect responses.

You can use the P option to print out this information. In addition, you receive a complete list of all items and answers included in the program.

### How to Change These Programs

To select a different set of items, delete, add to, or change the DATA statements to reflect the content you want. Each item consists of two parts. The question is a single string and all possible responses are included in a second string, separated by slash marks.

It is easiest to change the number of items that appear before you give a review to the student by changing the value of Q in line 80.

Now for the tough stuff. The program records an incorrect answer as a 1 in the SM$. You could change the program to record which incorrect response was selected. For example, SM$ = "+24**" might denote that item 1 was correct while the student selected the second possible response for the second item, and the fourth response for the third item. Have you got that?

This could be a tough programming assignment, since the program randomizes the answers before it prints them on the screen in the Quiz program. You need to find some way to show which answer was selected as it appears in the Retrieve program. You can do this and still have answers appear in random order. (Just send me a blank check or your most expensive piece of hardware and I will supply the solution.)

You could also change the Retrieve program to give a more comprehensive or complex analysis. You might include scales and coefficients for one or more of the several hundred methods of establishing reliability and/or validity. You might like percents correct and incorrect rather than the simple count.

### An Assignment for Nonprogrammers

I'd like your response to the remaining areas I have identified as needs for improving software:

- Including objectives defined in terms of observable learner outcomes—what objectives would you like to see a software program deal with?
- Explaining why a response is wrong—I am looking for relevant educational content (not programs) to include in future columns. Send me a list of items that might be used for computer-aided instruction. For each item, include some possible correct and incorrect responses. For some of the incorrect responses, include some information (kept short, please) to help the child learn why the answer is wrong, or give a better understanding of the correct answer.

Be creative. Think in pictures and sound, as well as with words. I would like to see more high-school and college-level content. ■

---

*If you have questions concerning this educational column address correspondence to Charles Santee, The Educated Guest, c/o* HOT CoCo, *80 Pine St., Peterborough, NH 03458.*

OS-9* SOFTWARE

**SDISK** — Standard disk driver module. Allows the use of 40 or 80 trk single/double-sided drives with coco OS-9, plus you gain the ability to read/write/format the standard OS-9 disk formats used on other OS-9 systems. — **$29.95**

**SDISK + BOOTFIX** — To create BOOTABLE double sided disks. — **$35.95**

**Filter Kit #1 — $29.95** **Hacker's Kit #1 — $24.95**

Send SASE for current catalog.
Terms: Prepaid by check, MO, VISA, Mastercard, or COD. Add $1 S&H, COD add $3.

**D.P. Johnson** 7655 SW Cedarcrest St., Portland, OR 97223
(503) 244-8152 (we appreciate your calling only 9-11 am PST) ✓99

*OS-9 is a trademark of MICROWARE and MOTOROLA, INC.

ATTENTION

FOREIGN COMPUTER STORES/MAGAZINE DEALERS

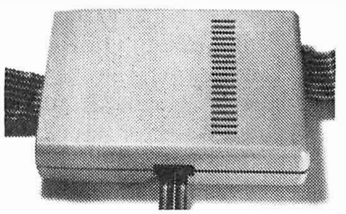
You have a large technical audience that speaks English and is in need of the kind of microcomputer information the Wayne Green Publications group provides.

Provide your audience with the magazines they need and make money at the same time. For details on selling **Microcomputing, 80 Micro, inCider, HOT CoCo, RUN, jr, and Wayne Green Books contact:**

SANDRA JOSEPH WORLD WIDE MEDIA
386 PARK AVE. SOUTH NEW YORK, N.Y. 10016
PHONE-(212) 686-1520 TELEX-620430

ATM-80

DATA ACQUISITION & CONTROL SYSTEM
FOR THE COLOR COMPUTER



APPLICATIONS:
• ENERGY MANAGEMENT • PROCESS CONTROL • SCIENTIFIC EXPERIMENTS • ROBOTICS • TECHNICAL EDUCATION • SECURITY SYSTEMS

FEATURES:
• 20us 8-BIT A-TO-D CONVERTER • 32-CHANNEL ANALOG MULTIPLEXER • PROGRAMMABLE GAIN AMPLIFIER • PEAK DETECTOR AMPLIFIER • 8-BIT D-TO-A CONVERTER • 4-BIT I/O PORT (PROGRAMMABLE) • 2K RAM • CONTROL SOFTWARE IN ROM • USER'S MANUAL

| | |
|---|---|
| ASSEMBLED & TESTED | $184.95 |
| MANUAL | $ 15.00 |

CLOCK/CAL/MEM CARTRIDGE

FEATURES:
• COUNTS HOURS, MIN., SEC., MONTH, DATE, DAY OF WEEK, YEAR, LEAP YEAR • PROGRAMMABLE INTERRUPT TIMER (.5, 5.0 AND 60 SECOND INTERVALS) • ROM BASED CONTROL SOFTWARE • 8K RAM SPACE • CLOCK BACKUP BATTERY

| | |
|---|---|
| ASSEMBLED & TESTED | $ 89.95 |
| W/8K RAM | $119.95 |

For more information, call or write to:

CYBERTRON TECHNOLOGY
3131 TIMMONS #723
HOUSTON, TEXAS 77027
(713) 840-1272 ✓536

# Reader's Forum

HOT CoCo *pays $25 for each Reader's-Forum submission used. In the case of duplicate submissions, selection is based on the earliest postmark.*

## Reformat Data

I wanted to take data saved in a direct access file and reformat or change it for a special printout, and to include records from a direct access file in a document in my word-processing program. The disk version of the new Telewriter 64 includes a utility called S.ASC that reads ASCII files into the editor, and I used this to do my reformatting.

While this utility works on sequential files, it won't read files saved through direct access, so I found the solution.

As it stands, lines 440–448 of the S.ASC utility open a file for sequential input and then LINE INPUT all records in that file. If you want to read in a direct-access file, a couple of minor adjustments are necessary. These are:

- Open the file to be read for direct access, not sequential.
- Field the input buffer.
- Start a counter of records input.
- Change the EOF check to an LOF check.
- Change LINE INPUT to GET statements.

First, you need to know the fielded length (fl) of the records. The program that generated the file tells you what it is. Once you have that, run your Telewriter, get to the disk menu and press B for Basic. Now, load the S.ASC program off your disk and edit the first command on line 440 so that instead of reading OPEN"I", #1, C$: it reads OPEN"D" #1, C$, fl: FIELD #1, fl AS A$: Z5=0:. Leave the rest of this line intact.

Now, rather than start a FOR...NEXT loop to read all records in the file, I incremented a counter before each record was read, then checked this counter against the LOF. This step replaces the EOF check in 445. I just made up the variable Z5 as my counter, figuring that it probably wasn't already assigned in the program, and I haven't had any problems. The Z5=0 that you put into line 440 zeros the counter.

Change line 445 to read Z5=Z5+1: IF Z5>LOF(1) THEN 458. If Z5 is greater than the last record in the file, there are no more records to read, and the program continues normally through line 458. Otherwise you read in that record number.

While you INPUT sequential records, you GET direct-access records, so line 448 must be changed to read GET#1,Z5. Since A$ is now defined in line 440, the computer knows where to put the records it is getting.

Type RUN and the program reads in your direct access files and returns to the editor when it is finished. You can now use the search and replace functions of Telewriter to modify your file and format it for printing.

The only problem I have found with this method is that no check is done to see if the file is on your disk. The OPEN "I" statement used to return an error if the file to be opened wasn't on the disk, but the OPEN"D" command opens a new file in that case. Check your disk to make sure the file you want is on it. If you don't, your disks might wind up with single granule files with no data.

*Duff Kennedy*
*Santa Barbara, CA*

## POKE/Program

This POKE/Program is interesting in that it prints a directory as well as free granules at the bottom of the listing:

```
50 POKE111,254:DIR:PRINT#–2,"FREE=> ";:
PRINT#–2,FREE[0]
```

*Craig Stalnaker*
*Glendale, CA*

## Does Gravity Have You Down?

Gravity makes an object moving on the screen come to life. With gravity you can make an object appear to float up and down instead of moving at a constant speed. Program Listing 1 makes a dot bounce.

The dot starts at the top of the screen and slowly gains speed as it falls. When it hits the bottom, it goes back up and then moves more slowly until it starts to fall again. I have also added INKEY$ so that when you press the up-arrow it slows down your fall.

The variable B is equal to five when you start, and the variable B1 is equal to zero. B1 in line 30 adds by .1 each time the program goes through the loop. Then I add B1 and B, which is the position of the dot. Line 60 checks to see if B is greater than 190. If it is, B1 is then equal to the opposite of what it was so now the dot goes back up.

If you don't have Extended Basic, you must make line 20 read CLS0, and in lines 40 and 70 you must use SET and RESET instead of PSET and PRESET. In line 60 you must compare B to 32 instead of 190.

This program can be used in any game that needs gravity.

*Mike Milde*
*Greer, SC*

FOR QUALITY EDUCATIONAL SOFTWARE
LOOK FOR THIS EMBLEM

A
T C E
PROGRAM
TM

SEND
FOR FREE
CATALOG

Dealer
inquiries
invited

TCE PROGRAMS INC.
P.O. BOX 2477 GAITHERSBURG, MARYLAND 20879

✓389

```
10 PMODE4,1:PCLS:SCREEN1,1
20 B=5
30 B1=B1+.1
40 PRESET(128,B)
50 A$=INKEY$:IFA$=CHR$(94)THENB1=B1-1
60 B=B+B1:IFB>190THENB1=B1-B1*2
70 PSET(128,B,1):GOTO30
```

*Program Listing 1. Gravity Demonstration*

## Kill Your Program

One of the shortcomings of Disk Basic's KILL command is that it doesn't erase the entire program from the disk. Instead, it sets the first character of the file name to zero and deletes the appropriate bytes from the file allocation table. Doing this just leaves confusing garbage on the disk, making it very difficult to salvage a disk should it ever crash. Here are two methods of erasing almost the entire program from the disk.

Method 1: Killing a Basic program:

- Load your Basic program; e.g., LOAD "ZAP".
- Type: FOR X=PEEK(25)*256+PEEK(26) TO PEEK (27)*256+PEEK(28): POKEX,255: NEXTX.
- Save your Basic program; e.g., SAVE "ZAP".
- Kill your Basic program; e.g., KILL "ZAP/BAS".

Method 2: Killing a machine-language program:

- Write down the addresses (beginning and ending) of the program.
- Load your program, e.g., LOADM "ZAP".
- Type: FOR X=(beginning address) TO (ending address): POKEX,255: NEXTX.
- Save your program; e.g., SAVEM "ZAP", BA,EA,O.
- Kill your program; e.g., KILL "ZAP/BIN".

By doing one of these steps whenever you kill a program, you should be able to salvage crashed disks much more easily.

*Kevin Chmilar*
*Calgary, Alberta, Canada*

## PCLEAR0

Color Computer users are familiar with the technique for simulating PCLEAR0. This is usually done from immediate mode as POKE 25,6:NEW [ENTER].

If, however, you have a disk system, this clobbers the disk scratch pad starting where graphics page 1 is located in nondisk systems. Disk users can get around this by entering POKE 25,14:POKE 3584,0:NEW [ENTER]. On a 32K disk system, this should free 28,967 bytes of memory (assuming CLEAR200, the power-up value).

*Alan A. Farmer*
*Charlottesville, VA*

## Help for Color Scripsit

On several occasions using Color Scripsit I failed to label a tape with the file name, and what I thought was the last file on the tape was not. Or I spelled the file name differently. Of course, the program continues to look for that file. It is no fun to lose several hours' work.

My solution was to buy the cheapest cassette I could, load it with a program and check to be certain I would get an I/O error with it. Now, I simply stop the tape, pop in the one I have labeled I/O ERROR, and in a jiffy I am out of the hang up. This works for data files, too.

*John M. Gregg*
*Florence, SC*

## Reachable Reset Button

Do you ever get tired of reaching behind tangled wires, around dangling power cords to reset the computer, only to pull the power cord out of the wall and lose your program? Then wire a reset button to the front of the computer. You can build one yourself.

First, find a pushbutton switch that suits you. A good one you can use is Radio Shack Part #275-1547. You can also use any other SPST momentary switch, normally open. Make sure that your computer is unplugged and take off the back.

Measure and mark the location of your button where it will not interfere with the keyboard or internal parts. Then, take a drill and carefully drill a hole, to size, where you marked it.

Next, take two pieces of wire, about a foot long each, and strip them at both ends. Solder one to the common on the switch, and solder the other one to the normally open contact on the switch. Then look for the reset button on the computer.

The reset switch should be composed of six contacts. Facing the front of the computer, solder the two wires to the two contacts on the right side nearest you (see Fig. 1). Now, take the wires and stuff them carefully in the crack dividing the circuit board and the casing.

On most switches, there is a mounting nut. Take the nut off and push the button through the hole you drilled. Now put the nut on with the button through the hole and tighten it so it doesn't jiggle back and fourth.

Put your case back on, making sure you got everything on correctly. Now if you wish, you can use both reset buttons.

*Erich Widemark*
*Phoenix, AZ*

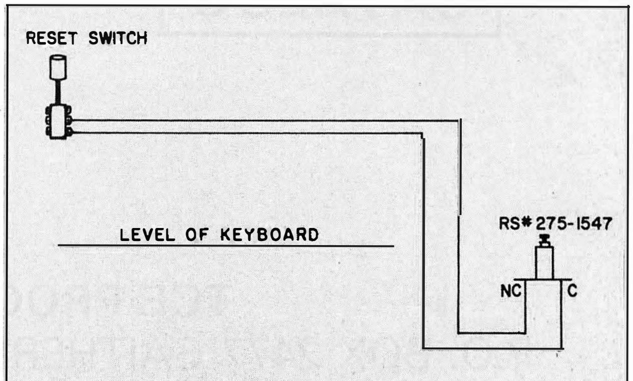


*Fig. 1. Reachable Reset Diagram*

# HOT CoCo

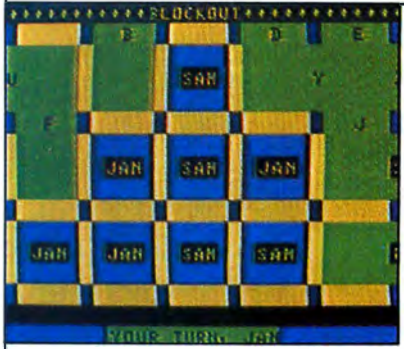
# Index to Advertisers

| Reader Service Number | | Page Number |
|---|---|---|
| 247 | 3G Company | 65 |
| 553 | A.J. Hillard, Inc. | 113 |
| 60 | Aleph Unlimited | 114 |
| 558 | The Book Company | 113 |
| 335 | Cer-Comp | 80 |
| 308 | CoCo Pro | 53 |
| 121 | Cognitec | 13 |
| 213 | Color MicroJournal | 87 |
| 455 | Compukit Corp. | 114 |
| 18 | Computer Plus | 5 |
| 506 | Computer System Center | 21 |
| 507 | Computer System Center | 63 |
| 223 | Computer System Consultants | 87 |
| 563 | Computerware, Inc. | 112 |
| 182 | Computize, Inc. | 81 |
| 536 | Cybertron | 95 |
| 562 | Crystal Software | 112 |
| 213 | Data-Comp | 87 |
| * | Dataman | 72 |
| 73 | Dayton Associates of W.R. Hall Inc. | 72 |
| 35 | Derringer Software | 26 |
| 557 | Dilithium Press | 112 |
| 209 | Dorsett Educational Systems | 49 |
| 99 | DP Johnson | 95 |
| 27 | Dragon User | 81 |
| 72 | Dynamic Electronics, Inc. | 81 |
| 216 | EAP Company | 72 |
| * | 80 Micro Subscriptions | 90 |
| 392 | Elite Software | 25 |
| 550 | Elite Software | 113 |
| 23 | Eng Systems Laboratories | 26 |
| 262 | Frank Hogg Laboratory Inc. | CIV |
| 98 | Green Mountain Micro | 37 |
| 9 | H&E Computronics | CIII |
| 440 | HJL Products | 9 |
| 359 | Homebase Computer Systems | 85 |
| | HOT CoCo Subscriptions | 18 |
| | Foreign Dealer | 95 |
| | Moving | 111 |
| 91 | Incentive Software | 69 |
| * | Instant CoCo | 27 |
| 450 | Instant Software | |
| 187 | Int'l Color Computer Club | 103 |
| 101 | J & M Systems | 20 |
| 190 | JBM Group | 15 |
| * | jr Subscriptions | 74 |
| 48 | Key Color Software | 72 |
| 395 | KRT Software | 87 |
| 426 | Logix Systems | 71 |
| 203 | Macrotron System Corp. | 45 |
| * | Mark Data Products | 31, 33 |
| 555 | Mark Data Products | 113 |
| 96 | Micro Management Systems | 12 |
| 196 | Micro Works | 16 |
| 39 | Micro-Ed | 47 |
| 256 | Minchey Enterprises | 103 |
| 551 | Moses Engineering | 113 |
| 323 | National Research Group | 53 |
| 288 | Oelrich Publications Inc. | 78 |
| 214 | P.B.J., Inc. | 86 |
| 207 | Parallel Systems | 30 |
| 320 | Parsons Software | 114 |
| 20 | PBH Computer Products | 3 |
| 124 | Perry Computer Products | 78 |
| 561 | Photographics Software | 112 |
| 4 | Radio Shack | 10, 11 |
| * | RUN Subscriptions | 42 |
| 538 | Sab-Link | 53 |
| 70 | Saguaro Software | 86 |
| 447 | Saturn Electronics | 77 |
| 510 | Scott Tasso Associates | 60 |
| 205 | Selected Software | 53 |
| 559 | Serious Personal Computing | 112 |
| 537 | Softmart | 39 |
| * | Software Support | 40, 41 |
| 456 | Sunlock Systems | 86 |
| 554 | Sugar Software | 113 |
| 224 | Syntactics | 65 |
| 174 | Syracuse R & D Center | 60 |
| 236 | T & D Software | 71 |
| 390 | TCE Programs, Inc. | CII |
| 389 | TCE Programs, Inc. | 97 |
| 450 | Typing Teacher | 55 |
| | Wayne Green Inc. | |
| 331 | Book Page | 91 |
| 331 | Machine Language | 73 |
| 331 | Rainbow Quest | 111 |
| * | Shelf Boxes | 103 |
| 170 | Wayne Technology | 85 |
| 156 | York 10 | 85 |
| 111 | Young Horizons | 114 |

*This advertiser prefers to be contacted directly.

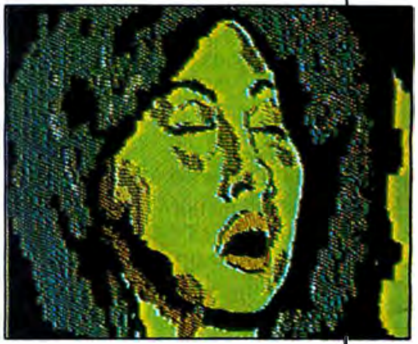
For further information from our advertisers, please use the Reader Service card.

# COMING NEXT MONTH



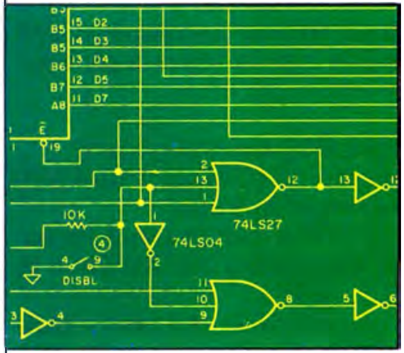
Summer heat is on its way and so is our next issue. You'll find it full of features, reviews, columns, and monthly items selected to boost your Color Computing capacity. At the work station or on the beach, *HOT CoCo*'s July issue is hot. Here's what's coming.

If you like Mike Meehan's Assembly-language game feature, follow us next month for a more detailed study of Croaker. This month, the title screen—next month, total dissection.



Reviewer Guier Wright takes a critical look at Graphicom and does a little dissecting himself.

How about a hardware project to take the tedium out of summer vacation? Randy Rollins explains how to add lowercase in hardware. This feature along with J.J. Barbarello's ROM Hacker, Part I should keep you from taking too much sun.



Next month's issue also offers you a collection-sorting routine (for all those bottlecaps in the bag behind your tool box?), a game called Python, Blockout for the MC-10, and the things you always find in *HOT CoCo*.

Grab a cold drink, plug your CoCo in by the pool, and get our July issue.

CoCo ROM
Master Interface

# Doctor ASCII

*by Richard E. Esposito*

*Got a problem with your Color Computer? Ask Doctor ASCII to solve it. Write to Doctor ASCII,* HOT CoCo, *Pine St., Peterborough, NH 03458.*

**Q.** I need a good disassembler that will let me disassemble ROM-pack, tape, and disk programs and modify them so that they can be reassembled and run. Do you have any suggestions?

*Chris Beard*
*Lawrence, MA*

**A.** The two disassemblers that come to mind are the Source Generator (The Microworks, P.O. Box 1110, Del Mar, CA 92014, $49.95) and Dynamite (Computer Systems Center, 13461 Olive Blvd., Chesterfield, MO 63017, $100). Both are written in machine language. The former works with Basic (tape or disk) and the latter comes in versions for either Flex or OS-9.

Even when armed with a disassembler, disassembly and reassembly is no easy task. The task of differentiating which part of a file is code and which part is data or text is left to you. Generally, this differentiation requires multiple runs and lots of printouts before you check a particular program.

**Q.** What do you mean by a "full travel" keyboard?

I mistakenly bought some TRS-80 Model I/III/4 software. Can it be somehow used in my CoCo?

Since I have a new-model CoCo, must I be careful in getting new-type software or can anything that says CoCo be used?

What brand disks do you recommend? I have a Radio Shack disk drive. Is this a decent unit?

Is there a good, simple book explaining the basics of creating programs, and a book explaining stuff like RAM, ROM, DOS, granules, EPROM, full-travel keyboard, and other questions for someone who is new to computers?

*John Moore*
*Montreal, Quebec*

**A.** Full-travel keyboards are made for the CoCo by HJL Products, Mark Data Products, Micronix Systems, and Key Tronics. They differ from the CoCo keyboards in that the distance that a key can travel when pressed is greater than that of the ones supplied with the CoCo. To see for yourself, compare the keyboards on the Models 4, 12, 16, and 2000 at your local Radio Shack store with the one on your CoCo.

Model I/III/4 software will not work on the CoCo unless it is written in Basic, and then you need some way to transfer it to CoCo format on tape or disk. The reason is that the CoCo uses Motorola's 6809 microprocessor whereas the Models I, III, and 4 use Zilog's Z-80. The machine languages for these two microprocessors are completely different. I might add that the CoCo's 6809 is by far superior.

I shop for disks with price in mind. You can get name-brand, single-sided, double-density disks for $2 or less each if you shop around.

The only reservation that I have about the standard CoCo drive is that it is rated for 35 tracks and is single sided. For less money, you can get a 40-track drive made by a reputable manufactuer (such as Tandon, Teac, or MPI), and for a little more, a double-sided drive.

The books that come with the CoCo are quite good for a beginner in programming. An excellent introductory book on computing in general is *Computers and Data Processing Concepts and Applications with Basic*, by Steven L. Mandell, West Publishing Co., 1982. A more advanced book on microprocessors is *An Introduction to Microcomputers, Volume I, Basic Concepts*, by Adam Osborne, Osborne/McGraw-Hill, 1980. You can also get answers to your questions by writing to me, here at *HOT CoCo*.

**Q.** Do you know if there is a book similar to *What's Where in the Apple* that lists all of the memory locations and their uses for the CoCo? I enjoy machine-language programming and it would be a big help.

*Greg Stine*
*New Martinsville, WV*

**A.** There have been a number of magazine articles on the subject: "Journey to the Center of the ROM," by Mark Goodwin (*HOT CoCo*) began with the October 1983 issue. It started with a simple memory map, then supplied a disassembler program and then embarked upon a detailed disassembly. Check this issue for Part VIII.

"Comment Corner," by the Micro Works' staff, began with the September 1981 issue of *Color Computer News*. It appeared at first on a regular basis and then sporadically. It was meant to be used with the output from the Micro Works disassembler.

"Dissecting Your ROM," by Jake Commander, began with the July 1983 issue of *Color Computer Magazine*. It has appeared in almost every issue since, but it deals with the 1.0 version of the Basic ROM. "Color Computer Memory Map," by Bob Russell, appeared in the July, August, September, and December 1983 issues of *Rainbow*. It gives addresses of key memory locations and of key machine-language routines in the ROMs. The new 1.1 disk ROM is not dealt with.

Commercially available are: *Color Basic Unravelled*, Spectral Associates, 3416 South 90th, Tacoma, WA 98409. There are three volumes to this commented source listing of Color Basic 1.2., Extended Basic 1.1, and Disk Basic 1.1. They are $19.95 each or $49.95 for the set.

*Color Computer Memory Map*, essentially the one from *Rainbow*, is available from Bob Russell, N5474 Stillwater Court, Fredonia, WI 53021, for $12.

**Q.** I have a 32K CoCo with an E board and wish to purchase a disk drive 0 for it. I have heard comments as to whether the new white disk drives from Radio Shack are any different from the older grey models. The staff at the Radio Shack Computer Center said that they keep the white with the white and the grey with the grey, but didn't know the reason. Is there actually any difference in either the drives or the controllers?

If I get the drives, can I add 64K chips in place of my 32K piggyback that I now have? What hardware modifications must I do to get the full 64K, besides change the chips, jumpers, and remove the capacitors?

I have a DMP-120 printer. Is there a program available that will copy a high-resolution display from the screen to the printer?

*Brian Fistler*
*Pella, IA*

**A.** The CoCo 2 does not supply 12 volts to the slot on the right side of the computer that are needed to power the disk controller that comes with the grey drive. The white drive's internal power supply furnishes the necessary 12 volts to its controller. A CoCo 2 with the Multi-Pak Interface should work with either drive since the Multi-Pak has its own 12-volt supply. Since the white drives do not need the 12 volts coming from the computer, they should work with either machine. I personally prefer the older controller because you do not need to modify an off-the-shelf standard drive to use it with the CoCo. My present configuration consists of two 80-track, double-sided drives with one 40-track drive for compatibility. I am using Flex with 80 tracks, both sides, and OS-9 with 80 tracks, one side.

The installation of 64K is independent of the number of drives that you have. Aside from what you mentioned above, do the following: Locate and remove the two ICs labeled U11 and U29. They should be a 74LS138 and a 74LS02. Carefully bend pins 4, 5, and 6 of the 74LS02 straight up. Remember, chips are numbered counterclockwise from the notch. Bend pin 5 of the 74LS138 straight up. Solder a short piece of 30-gauge wire to pin 8 of the 74LS02. Solder this at the point where the pin enters the chip because this pin must go back into the socket. Solder the other end to pin 6 of the same chip. Replace the chips in their sockets. Solder a piece of 30-gauge wire from pin 5 of the 74LS138 to pin 4 of the 74LS02. Finally, locate TP1 and solder one end of a length of 30-gauge wire to pin 5 of the 74LS02 and wire-wrap the other end on TP1.

It is not in the latest version of the TRS-80 catalog, but John Soles of the Radio Shack Plus Computer Center in Columbia, MD, kindly supplied me with the following information: There is a new product, Hi-Res Screen Print Utilities, Radio Shack cat. no. 26-3121, $9.95. It consists of two programs: CO-dump and BW-dump. They are position-independent and compatible with the current line of Radio Shack printers. CO-dump gives you a color picture with a color printer and BW-dump gives you a black-and-white picture with a monochrome printer. They are compatible with PMODEs 3 and 4.

**Q.** I have a D board that has been upgraded by Radio Shack to 32K. Are these 64K chips, and if so, can I get 64K without purchasing another set of RAMs?

*Gary Dickerson*
*Tucson, AZ*

**A.** You need only complete the procedure outlined in the response to Brian Fistler above starting with "Locate and remove." To see if your chips are all good, run the memory-testing program that appeared in this column in the March 1984 issue (p. 136) in response to Jack Thompson's letter.

**Q.** I recently purchased a 16K Extended Basic CoCo with a new version, printed circuit board revision A. My board does not seem to have any jumpers. How do I upgrade to 64K?

*Simon Bitton*
*Montreal, Quebec*

**A.** From your description, I assume that you have a CoCo 2. Bob Rosen of Spectrum Projects has volunteered the following procedure to upgrade a CoCo 2:

- Remove the six screws from the bottom of the CoCo 2 including the one under the warranty label.
- Remove the keyboard, being careful when removing the ribbon contact from the board connector.
- Remove the eight 16K memory chips from sockets U14 through U21.
- Install a jumper wire between the two solder pads to the right of W1. Find W1 diagonally between U6 and U7.
- Install eight new 4164 dynamic RAM chips in sockets U14 through U21. Be sure to line up the notches and take precautions to avoid static discharge.
- Replace the keyboard and carefully reconnect the ribbon contact. Replace the six screws and run my memory test (Doctor ASCII, March 1984, p. 136).

**Q.** I recently purchased a DMP-100 printer. Can you help me find a machine-language graphic screen dump that will send a PMODE 4 screen to my printer?

*John Skahan*
*Manhattan, KS*

**A.** The BW-dump program of Radio Shack's new Hi-Res Screen Print Utilities (cat. no. 26-3121, $9.95) should do the trick.

**Q.** I recently purchased a 16K standard CoCo at the close-out price of $119.95. I would like to upgrade to 64K and add Extended Basic. Should I wait 90 days before opening the case? Do you have any other suggestions?

*Steve Brewster*
*Pocatello, ID*

**A.** Adding the memory and Extended Basic is a fairly simple process. Since you have an F board, adding memory only involves substituting the eight RAMs and adding a jumper. Adding Extended Basic is simply a matter of plugging a chip into an empty socket provided in your CoCo for that purpose. I would caution you to run your machine for at least 100 hours and check all features such as the keyboard, RS-232, and cassette ports to make sure they work when the machine is both hot and cold. This is a good idea even for those who plan no modifications. When you are convinced that the machine is 100 percent, then proceed with the mods. The newest catalog, RSC-11, lists the 64K memory chips, cat. no. 26-3017, at $69.95, and the Extended Basic kit (ROM and manual), cat. no. 26-3018, at $39.95. All you need do now is find someone who will sell them to you without the "required" installation.

```
10 FOR I= 24576  TO  24758
20 READ X
30 POKE I,X
40 NEXT I
50 CSAVE"GDUMP",&H6000,&H60B6,&H
6000
60 DATA  158, 186, 175, 141, 0,
177, 48, 141
70 DATA  0, 144, 141, 77, 111, 1
41, 0, 174
80 DATA  111, 141, 0, 165, 198,
7, 166, 141
90 DATA  0, 164, 167, 141, 0, 15
6, 111, 141
100 DATA  0, 153, 111, 141, 0, 1
53, 141, 65
110 DATA  102, 141, 0, 143, 108,
 141, 0, 138
120 DATA  90, 38, 243, 166, 141,
 0, 132, 68
130 DATA  141, 44, 129, 3, 38, 2
, 141, 38
140 DATA  108, 141, 0, 117, 38,
206, 166, 141
150 DATA  0, 112, 167, 141, 0, 1
12, 129, 191
160 DATA  35, 190, 48, 141, 0, 8
3, 141, 1
170 DATA  57, 166, 132, 129, 4,
39, 6, 141
180 DATA  5, 48, 1, 32, 244, 57,
 126, 162
190 DATA  191, 52, 22, 166, 140,
 75, 68, 68
200 DATA  68, 167, 140, 73, 166,
 140, 67, 129
210 DATA  191, 34, 28, 198, 32,
61, 227, 140
220 DATA  59, 174, 140, 51, 230,
 139, 18, 166
230 DATA  140, 47, 132, 7, 76, 7
4, 39, 3
240 DATA  89, 32, 250, 89, 53, 2
2, 57, 95
250 DATA  32, 249, 27, 74, 44, 5
0, 57, 51
260 DATA  44, 54, 53, 57, 44, 36
, 13, 3
270 DATA  4, 3, 2, 27, 74, 44, 4
8, 44
280 DATA  57, 54, 48, 44, 36, 13
, 4, 255
```

*Program Listing 1. GDump*

**Q.** I saw a letter in the January issue about a reader who needed a screen dump for the IDS Micro Prism 480 printer. I am enclosing a copy of one that I wrote, GDump. It prints a small picture (3½ inches wide) with one dot per pixel. I also modified it so that you can get a double-sized screen print (7 inches wide). This is shown in GDump 2. Both routines are relocatable.

*Charles Hall*
*Raleigh, NC*

**A.** I am sure that owners of the IDS Micro Prism 480 will appreciate your efforts. For those without an assembler, I have converted your programs to POKE routines. (Listings 1 and 2). ■

*Program Listing 2. GDump 2*

```
10 FOR I= 24576  TO  24768
20 READ X
30 POKE I,X
40 NEXT I
50 CSAVE"GDUMP2",&H6000,&H60C0,&
H6000
60 DATA  158, 186, 175, 141, 0,
187, 48, 141
70 DATA  0, 154, 141, 87, 111, 1
41, 0, 184
80 DATA  111, 141, 0, 175, 198,
7, 166, 141
90 DATA  0, 174, 167, 141, 0, 16
6, 111, 141
100 DATA  0, 163, 111, 141, 0, 1
63, 141, 75
110 DATA  102, 141, 0, 153, 99,
141, 0, 153
120 DATA  38, 4, 108, 141, 0, 14
2, 90, 38
130 DATA  237, 166, 141, 0, 136,
 68, 141, 48
140 DATA  141, 46, 129, 3, 38, 4
, 141, 40
150 DATA  141, 38, 108, 141, 0,
117, 38, 196
160 DATA  166, 141, 0, 112, 167,
 141, 0, 112
170 DATA  129, 191, 35, 180, 48,
```

Listing continued

*Listing continued*

```
 141, 0, 83
180 DATA  141, 1, 57, 166, 132,
129, 4, 39
190 DATA  6, 141, 5, 48, 1, 32,
244, 57
200 DATA  126, 162, 191, 52, 22,
 166, 140, 75
210 DATA  68, 68, 68, 167, 140,
73, 166, 140
220 DATA  67, 129, 191, 34, 28,
198, 32, 61
230 DATA  227, 140, 59, 174, 140
, 51, 230, 139
240 DATA  18, 166, 140, 47, 132,
 7, 76, 74
250 DATA  39, 3, 89, 32, 250, 89
, 53, 22
260 DATA  57, 95, 32, 249, 27, 7
4, 44, 49
270 DATA  49, 48, 44, 56, 52, 50
, 44, 36
280 DATA  13, 3, 4, 3, 2, 27, 74
, 44
290 DATA  48, 44, 57, 54, 48, 44
, 36, 13
300 DATA  4, 0, 0, 0, 0, 0, 0, 0
```

*END*

MODEM

BYTE-BACK MODEM

LOWEST PRICE EVER FOR A FULL DUPLEX ORIG./ANS. MODEM

69.95

INCLUDES CABLE AND 2 FREE HOURS ON COMPUSERVE

SAVE-A-BYTE BATTERY BACK-UP $59.95

See Review in Rainbow December '83

GORILLA/BANANA PRINTER $199.95

NEW LOW PRICE 64K RAMS 8 FOR $43.95

ALL MODULES CARRY 90-DAY WARRANTY

TRY BYTE-BACK MODULES FOR 10 DAYS WITH NO OBLIGATION

CHECKS
MONEY ORDERS

ASK ABOUT DEALER DISCOUNTS

Mail To:
BYTE-BACK CO.
Department R-1
Rt. 3, Box 147 • Brodie Rd.
Leesville, S.C. 29070

Shipping and Handling $4.95

✓256

Ph. 803-532-5812

MAKE IT EASY TO SAVE your copies of HOT CoCo

Your magazine library is your prime reference source—keep it handy and keep it neat with these strong library shelf boxes. They are made of white corrugated cardboard and are dust resistant. Use them to keep *all* your magazines orderly yet available for constant reference.

Self-sticking labels are available for the following:

*80 Micro*
*Microcomputing*
*inCider*
*RUN*
*73 Magazine*
*QST*
*CQ*
*Ham Radio*
*Radio Electronics*
*Personal Computing*
*HOT CoCo*
*Interface*

One box (BX1000) is $2.00, 2-7 boxes (BX1001) are $1.50 each, and 8 or more boxes (BX1002) are $1.25 each. Be sure to specify which labels we should send.

Call TOLL-FREE for credit card orders:

1-800-258-5473

Or use the order form in this magazine and mail to:

HOT CoCo
Attn: Book Sales, Peterborough, NH 03458

☐ SHIPPING AND HANDLING CHARGES $2.00 per order, up to and including a quantity of eight. 25¢ for each additional box ordered. ☐

INTERNATIONAL COLOR COMPUTER CLUB, INC. ✓187

We are in our THIRD year and we would like to give to the first 1,000 Color Computer Users that request information on joining the club a

FREE SAMPLE ISSUE

of our club bi-monthly newsletter. We are also having a drawing for a FREE ICCC, Inc. T-Shirt ($8.00 Value) on the 12th of April. So, send in your name to be put in the pot (1 out of 500 will win). All entries must be postmarked no later than April 1st.

Membership fee is $30 U.S., $40 Canada & Mexico, $50 Overseas Surface rate, and $90 Overseas Airmail rate. All prices are in U.S. funds.

Discounts to members are from 5% to 25% off Major Companies' prices such as: the RAINBOW, Hot CoCo, PCLEAR-80, Sugar Software, and more...

Our library contains over 170 programs for the CoCo, TDP-100, and the MC-10 along with 32 (or more) R.S. ROMpacks and over 100 good books.

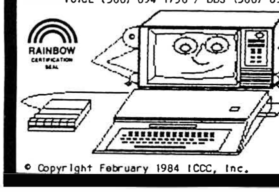
Our Part's Library can save you down time while waiting for a part for your computer and the price for parts is not that high if you decide to buy the parts instead (eg. CoCo Case $15 gray/$30 white, ECB Chip $76, 8 64K Chips $46, or BASIC and Disk ROMs $20). We also do upgrades to all computers for $10 - $25, depending on version and upgrade type.

For more information or a charge application over the phone, you can call either the VOICE line (regular telephone line) at 214-657-7834 or call the Bulletin Board System at 214-657-8147.

Make sure you take note of all NEW prices and addresses.

*Main Office*
2101 E. Main St., Henderson, TX 75652-3399
VOICE (214) 657-7834 / BBS (214) 657-8147

*Canadian Branch*
P.O. Box 7498, Saskatoon, SK S7K-4L4
VOICE (306) 694-1750 / BBS (306) 693-9429



© Copyright February 1984 ICCC, Inc.

INTRODUCING
•THE OFFICIAL•
INTERNATIONAL COLOR COMPUTER CLUB, INC TEE SHIRT
ORDER YOURS TODAY!

Gray with Black LOGO & Trim (Please specify size - Sm, Med, Lrg, or X-Lrg)

$6.00 (add $2.00 S/H for U.S. & possessions, Mexico & Canada)(add $4.00 S/H for overseas orders) Check or Money Order

SEND TO:
PBK & Associates
5603 Linwood Ct.
Seabrook, Md. 20706

International Color Computer Club, Inc.

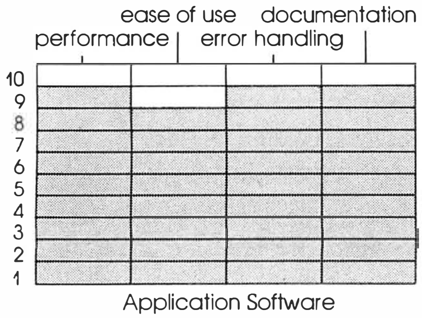
(write about custom shirts for Your Users Group!)

# REVIEWS

## CONTENTS

Pro-Color-File Enhanced 104
The Factory 105
Business Manager 105
RMS (Record Management System) 106
Atom 107
Filmastr 1.2 108
Micro Compac 109

*edited by Mark E. Reynolds*



**Pro-Color-File Enhanced**
**Derringer Software**
**P.O. Box 5300**
**Florence, SC 29502**
**32K**
**$79.95 disk**

**by Scott L. Norman**

Back in August 1983, I wrote a review of version 2.0 of Dennis Derringer's potent database manager, Pro-Color-File (*HOT CoCo*, p. 23). Now he has produced an enhanced version of this powerful program, and this review update is to let you know of the improvements he has added.

As with the earlier versions, Pro-Color-File Enhanced lets you perform fairly extensive calculations on information you've stored, and it offers a multitude of commands for sorting a file and for selecting individual records. The enhanced version offers the same features as the earlier one, but the author has added some new items, expanded the number of reports and computational equations you can define, and improved the documentation.

Besides some expanded original characteristics, Pro-Color-File has the newfound ability to define up to six short printed report formats (mailing labels, actually). These are in addition to the eight different formats available for full-size reports.

Label formats are stored on disk under their own names, and you can protect each with a five-letter password against unauthorized access. Specifying the fields to be printed is simpler than the corresponding task for reports; now it's merely a matter of listing the number of the fields, separated by commas, on the appropriate lines of the video display.

Parameters under your control include print font, the number of horizontal and vertical spaces between labels, and the number of labels across a sheet.

There are other applications besides actually printing shipping labels, of course. The manual points out that label formats are ideal for printing columns of data. If you are using an 80-column printer, then by setting the label-to-label horizontal and vertical spacings to 40 and 1 and the number of labels across to two, you'll get a perfect two-column page. This might be easier than setting up a two-column report of the normal kind, especially if you don't need headings and totals.

Pro-Color-File's mathematical abilities have been improved. The equations defined in earlier versions of the program could contain the four elementary operations, and there was a shorthand way of indicating that you should sum fields occupying a number of sequential columns, but that was it.

Now it is possible to set up a relative equation—a single equation that you can apply to multiple sets of data fields by automatically changing the field references it contains. This is a bit like the relative-addressing capability of spreadsheets.

Along with relative equations comes another enhancement: the ability to post (i.e., make mathematical changes) to the entire file at once. The term comes from the concept of posting charges to a financial account, but you can't use equations for posting on individual records.

You can define and store up to nine prompting messages for keyboard input. A posting routine often needs such input. For instance, it can be important to enter the date on which you're updating a database. Information entered in response to these messages is typically placed in undefined fields (i.e., fields that the data file itself isn't using). The program then passes the values to the fields where additional equations need them.

The earlier Pro-Color-File documentation was densely packed. The manual has more than doubled in thickness, growing to 71 pages, and there are now quite a few illustrations of what you might expect to see on the screen at various points. It also includes a pair of sample database setups, complete with multiple label and report formats.

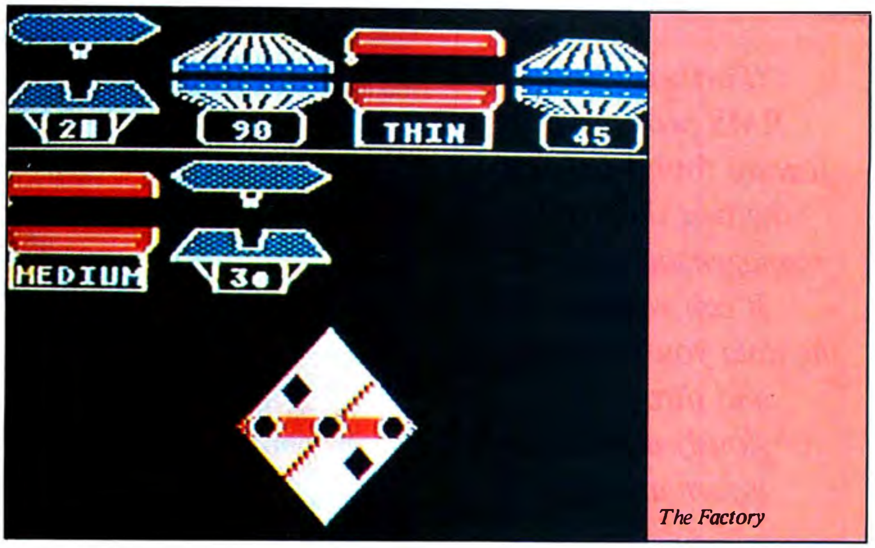
I still wouldn't call the document light reading, and there are a few minor typos, but in general there has been a great improvement.

> *". . .Mr. Derringer continues to perfect his program technically. . ."*

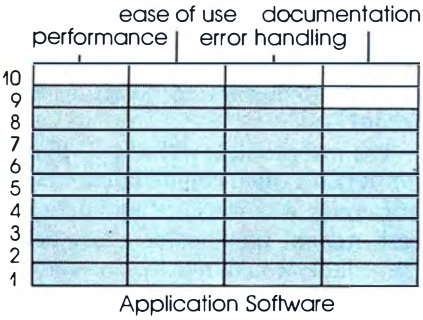
Program author Dennis Derringer has also demonstrated his willingness to keep customers apprised of problems and their remedies. Pro-Color-File is a complex system, and it has happened that individuals have found flaws in one aspect or another of its operation; a couple of bugs that surfaced in the report-generation routines under certain specific conditions come to mind.

But Mr. Derringer continues to perfect his program technically, and he's very good at helping customers who have problems.

Pro-Color-File Enhanced remains a major force on the Color Computer database manager scene. ■



*The Factory*



**The Factory**
**Sunburst**
**39 Washington Ave.**
**Pleasantville, NY 10570**
**32K**
**$49 disk**

**by Mark E. Reynolds**
***HOT CoCo* staff**

The idea of educational games sometimes reminds me of the TV commercial in which two small boys refuse to eat their breakfast cereal simply because it's supposed to be good for them. I don't think you'll trick too many kids into learning math facts or spelling words simply because you present it on the same machine that brought them Space Invaders.

But where's the balance between "educational" and "game"? You'll often see a weak lesson lost among lots of fast-paced arcade action, or a traditional, textbook-style presentation thinly disguised as a lackluster arcade game.

Take a look, though, at a rare piece of software like The Factory. It's definitely a fascinating game, and it's definitely educational, though it makes no pretense at competing with the video arcade or the textbook. But it does use the computer's unique capabilities to present a truly interesting and valuable means of cognitive-skill development, and no other medium (besides an actual factory) could provide the same interactive experience.

This program puts three machines at your disposal: a punch, a block rotator, and a striper. You use them individually or in combination to create patterns on squares of raw material that pass along an imaginary conveyor belt on the computer screen.

With the punch you can make one, two, or three square or round holes. The rotator turns the raw material 45, 90, 135, or 180 degrees counterclockwise, and the striper makes a thin, medium, or thick stripe across the square.

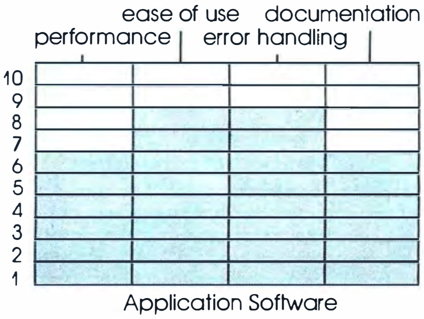
The program leads you through step by step, showing you how each machine works, and presenting opportunities to use them to produce various results. The challenge comes when you try to use as few machines as possible to create the complex designs that you imagine, or that the computer shows you.

The Factory's educational value then isn't in teaching traditional lessons such as reading, spelling, or math (though it does teach degrees of rotation very well). This game forces you to *think*, as you look at a finished product and decide through what machines, and in what order, you must send a piece of raw material to produce the desired result.

The more difficult designs are challenging for adults, and the program offers a choice of easy, medium, or difficult designs to copy. Sunburst recommends The Factory for ages 7 to adult, and, obviously, the younger the child, the more he will pick up from the game.

The Factory is excellence in educational gameware. Its attractive, precise graphics portray the machines and depict your raw material as it goes through the steps you've planned. You see only the side view of the material as it moves through each process, and the anticipation builds as you watch the machines punch, rotate, and stripe the square and you wait to see the final product. Will it look like you want it to?

This is a good, challenging game. It also provides plenty of cerebral exercise as you mentally visualize and plan the steps in a physical process. The Factory isn't inexpensive, but from the packaging on, it's a first-class program. If there's someone around your house who might be a future engineer, or otherwise need to develop visualization and planning skills, I think you'll find this educational game worth the price. ■



**Business Manager**
**80 Custom Software**
**5720 Brooke Lane**
**Sylvania, OH 43560**
**32K, Extended Color Basic**
**$24.95 cassette**
**$29.95 disk**

**by Martin Klaver**

Business Manager, by John Nyitray, is a simple Basic program that tracks income and expenses for a small business or a household.

The program produces monthly and yearly statements showing the totals of all accounts, and a simple balance sheet showing gross income, expenses, and profit.

You can enter up to 28 income and expense accounts, and the Business Manager will keep up to 300 entries in memory at one time. Each month you can add the monthly to the yearly totals and clear the monthly account totals to begin the new month.

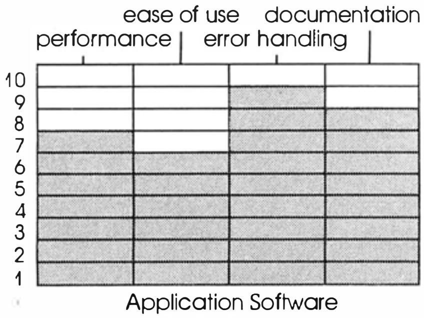
The program uses serial files loaded into RAM rather than random-access files. While this limits the possible number of transactions, it also makes the program run quickly.

The Business Manager also moves rapidly from one function to another and is quite easy to use. It doesn't take much to delete or replace an entry or to review your transactions. Each transaction record shows the account date and the source of income or recipient of payment.

Neither does Basic slow the program noticeably. For the functions carried out with this software, Basic is satisfactory.

Because the program is in Basic, it would be easy to modify Business Manager to meet particular needs. You could extend it for cash register or checking purposes, for example.

However, if you only need a check-management program, software designed specifically for that purpose might be a better choice. Business Manager is not intended for demanding business applications, but it is suited to the simpler requirements of a home or part-time business. ■



**RMS (Record Management System)**
**Washington Computer Services**
**3028 Silvern Lane**
**Bellingham, WA 98225**
**64K, Flex**
**$200**
**($250 OS-9 version)**
**($300 Uniflex version)**

**by James Perotti**

A good file-management system provides easy access to records and lets you find, select, or update specific information. As such, RMS, with its strong file-manipulation abilities and report writer, is a good choice for the small business. It provides a simplified way to write difficult business applications and handle substantial amounts of information. It does, however, have some limitations.

> *"Furthermore, RMS provides a feature found only on the best database management systems: It can validate the data you're entering and throw out obviously erroneous information."*

At the heart of RMS is a machine-language program that accesses, updates, reads, and writes files. RMS uses direct-access files, which means that it doesn't need to read through all the records in a sequential file to find the record it is looking for. As a result, it can operate quickly and accommodate a large number of records.

RMS becomes a good option for small businesses with on-line informational needs. In a retail operation, for example, you could place all stock in an inventory system that could quickly show clerks the items that were in stock.

### File Manipulation

When creating a new record with RMS, you work with a formatted screen that prompts you for necessary information. Therefore, even inexperienced users can readily enter or change data. Just put your information on dotted lines that represent the allowable field length.

Furthermore, RMS provides a feature found only on the best database management systems: It can validate the data you're entering and throw out obviously erroneous information.

Validation can mean, for example, that RMS will accept only alphabetic data of a certain length for city or state; or balances between $1 and $999.99; or credit standings of X (excellent), G(ood), F(air), or P(oor). RMS will even look up valid entries in a file. For example, the file could contain a table of suppliers with whom you deal.

Validation checks can prevent numerous errors and prevent many unwanted headaches with customers. Managers can have much more confidence in the accuracy of data their clerks have entered, since the screen format and validation checks make mistakes less likely.

Unless you have a Flex editor, however, you might find creating the data-entry screen frustrating. RMS comes with its own line-oriented editor by which you create the screen and enter and update all data. But the RMS editor is clumsy to work with. It made formatting the screen a major hassle.

To begin with, I had to hold down three keys simultaneously for most commands. For example, I had to press shift/break/I to insert a new record.

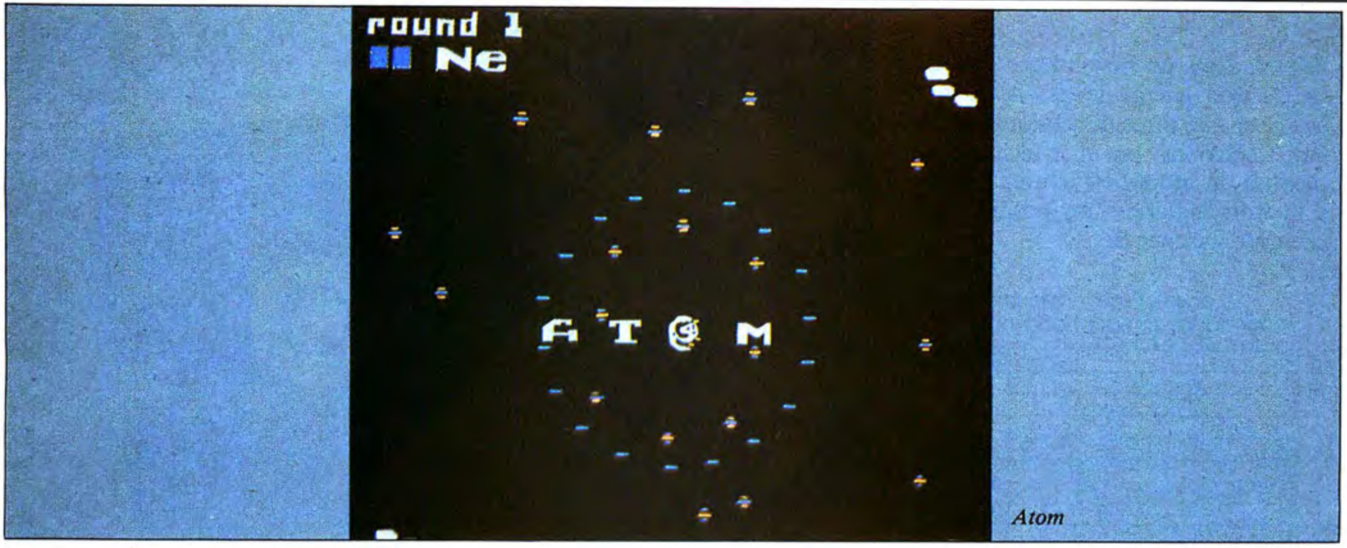
The real problem with the RMS editor is that I often could not tell what I was doing. As I was creating a data file with student numbers as a key field, the editor would not accept certain numbers and confused 03 with 3. The result was a file with duplicated records.

I had similar problems updating (changing) the screwed-up records. I then decided to delete the duplicated records, which worked well. But I had earlier defined my file as having 50 records, and RMS counted the deleted records.

Potential buyers must also understand that RMS cannot compute numbers in fields. Therefore, it's aptly named a record management system (for keeping textual records), since it doesn't handle quantitative data-management tasks.

For example, the small-business man who wants to update his payroll master file won't find RMS suitable for his needs. In order to compute net pay, the program must subtract the deductions from the gross pay, but RMS can't perform this simple arithmetic.

The RMS manual describes how to prepare Basic programs to perform these computational tasks, but they require some serious programming efforts. Think about it. You might need to read the monthly pay rate (gross) and the different deductions from the update file, perform the subtraction,



*Atom*

and write the answer as a new field in the new master file. You might also need to read the old master file and write to the new to compute the year-to-date gross and net pay. Shades of Cobol!

### Indexing the File

RMS lets you sort the data file, and in that way improve performance. All you need do is create an index file that tells RMS which field to use for a sort in ascending order. If you are inserting records that are in alphabetic order, then sorting the file that way lets you hit the "next" command to move the next name in that sequence.

Conversely, if you're working with dates, sort the file by the date field. When information is printed out, it is important that it be in the order most readable by people and not in an order most effective for the machine.

The indexing is really a resequencing of direct-access files, and RMS uses a form of indexed sequential access method (ISAM). As IBM mainframe users have discovered, ISAM is a terrific feature to have with large files.

### The Report Writer

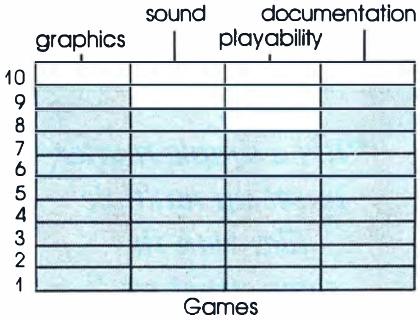
Report is a separate program in the RMS package that is very nicely done. It does two things: It provides a way to format file information for printing, and it provides a way to select specific information. The Report file can contain commands to format a title page, a regular report page, and a summary wrap-up page. It can subtotal or total numeric fields or write headers for the top of any of the pages. You can include or exclude fields or records from the report.

Once again, however, you'll find creating the Report file frustrating without a Flex editor.

### To Buy, or Not to Buy

Potential buyers must consider the advantages and disadvantages of RMS. It has strong file-management and report-writing features; it provides fast on-line query capability, and therefore might be very useful for a small business.

On the other hand, it can't compute file data, and the RMS editor is a serious flaw. Depending on the kinds of information you keep, the ability to compute fields might not be important to you. The editor, however, is an important part of the package and a major source of frustration. ■



**Atom**
**Tandy/Radio Shack**
**1400 One Tandy Center**
**Fort Worth, TX 76102**
**Cat. No. 26-3149**
**$19.95, 16K ROM pack**

**by James W. Wood**

Radio Shack's educational program, Atom, challenges you to construct electron shells for the elements hydrogen through xenon. The package includes a ROM pack, a 22-by-34-inch poster displaying a space station in the form of a spiral periodic chart, and an instruction book.

The 12-page instruction book presents chemical facts with drawings to illustrate states of matter, subatomic particles, periodic charts, and the characteristics of some of the elements.

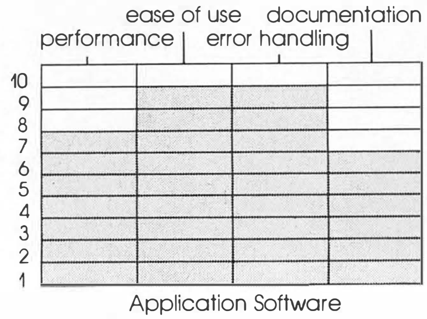
Atom gives a choice of a black, buff, or green screen background. The screen includes a game clock, bunkers, free electrons, electron holes, a nucleus, playing graviton, and reserve gravitons. The clock is calibrated in nanoseconds.

To play you use the joystick to maneuver your graviton to pick up free electrons and shoot them into the electron holes of the correct energy level. Students who tried to play the game without reading instructions were confused and told me the joystick was broken. But this just shows them that reading can be important.

You lose your graviton by colliding with a free electron or a bunker, or by placing an electron into an incorrect energy level. When the clock runs out, the unstable atom explodes, sending you back to the first element of the energy level you are on. Being an atom builder isn't an easy job, but someone has to do it.

The sound effects are as good as I have heard on any CoCo game, but I wasn't so impressed with the reward of seeing the element I created appear on the periodic chart. The lack of a sudden death or a retained high score also detract from the gaming appeal.

However, Atom is not just a game. It is an effective educational tool that uses color, motion, and interaction to help students understand the concept of electron energy levels. It doesn't touch on the three-dimensional s,p,d, and f sublevels, but if it included all theories on atomic structure, I might start worrying about my position as a chemistry teacher. ■



**Filmastr 1.2**
**The Computer House**
**Box 1051**
**DuBois, PA 15801**
**16K, Extended Color Basic**
**$29.95 cassette**
**$34.95 disk**

**by Scott L. Norman**

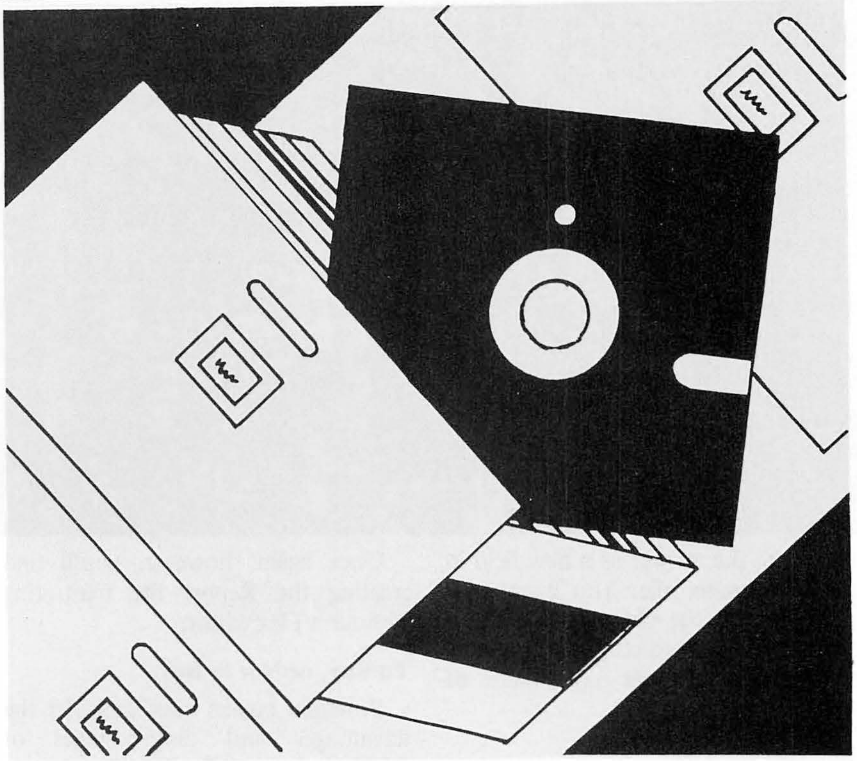
Filmastr is a medium-priced data manager best suited for files of moderate size and complexity. Its mathematical abilities are quite limited, so you probably wouldn't want to use it for data requiring a lot of calculation.

On the other hand, it boasts fast sorting and selecting operations and can be quite useful for keeping track of information that you must frequently rearrange and break down according to the values in various fields. It is easy to learn, too.

Version 1.2 is an upgrade that eliminates any need for you to issue PCLEAR commands to reserve memory. A single command starts either the tape or disk version, and Filmastr seems to run on both old and new ROM configurations.

The tape and disk versions are quite similar in operation, which means the properties of tape as a storage medium actually dominate the program's operation. In other words, since tape is not a random-access medium, Filmastr has to be memory-resident; the entire work file must fit into RAM and leave enough room for the rearrangements that take place during a sort.

This isn't necessarily a bad thing. It limits the size of the files you can deal with, but it is also partly responsible for the speed of sorting and selection.



Since Filmastr stores all records in a file as fixed-length strings, the length varying from file to file, its capacity is best expressed in terms of the total number of characters it can support. A 16K computer has space for about 9,000 characters in the data file, while a 32K machine can store about 24,000.

There are some restrictions as to how you can organize the data, though. You can't include more than 20 fields—or 255 characters—per record.

> *"It's a simple matter to set up multiple files with the same structure."*

Strangely enough, the 255-character restriction is only mentioned in the advertisements—not the documentation. So if you haven't read the ad, you might try to set up longer records, and you won't learn of your mistake until you try to read a recorded file back from tape or disk. Then it's too late, because you receive an error signal and the program returns control to Basic.

You enter data into screens you design. It's easy to set one up, and the program makes no distinction between alphabetic and numerical data, so it is not necessary to learn any codes to designate what sort of information you will enter into the various fields.

It's a simple matter to set up multiple files with the same structure: Just read in the common screen format, fill it with your data, and save it to disk or tape under its own name.

### A Screen Editing Problem

Filmastr offers full-screen editing during data entry, but I encountered a problem using the shifted down-arrow command to delete a character and close up the resulting space.

The difficulty first appeared when I was working on a nearly complete record and decided to use the command to delete part of an unsatisfactory field. As I deleted characters, I noticed part of a previously-entered field from another record starting to creep into the screen where I was working.

Typing in new material didn't push the intruding text off the screen, either. I had to use the shifted up-arrow combination to insert enough blank spaces to force it off the screen.

The troublesome thing was that this interfered with my ability to scan through my file. When I saved the data and then reloaded it into RAM, I found that Filmastr would not page through the file one record at a time:

The display would begin with the first record, all right, but commands to advance by one record resulted in only part of the display changing. This would eventually mix data from several records on the screen.

I subsequently duplicated the effect with other complete files loaded from disk. If I repeatedly used the shifted down-arrow to edit old fields, the whole organization of the file eventually seemed to suffer. Until someone eliminates this problem, you'd better edit by overtyping incorrect material and using the space bar to blank out anything left over.

### File Management

Filmastr can quickly sort a file into ascending order according to the contents of any field. It can also order 300 records in about five seconds, according to the documentation. It treats numbers just like alphabetic data. Leading spaces are ignored in the sorting process, so 10 is considered smaller than 5. To keep things straight, use the same number of digits for everything in a numerical field: 5 should be 05, and so on.

The ability to select records is an important aspect of database management, and Filmastr is versatile in this regard. You can select records on the basis of a complete or partial match with a key phrase and designate any field for the comparison. You can also use the relational operators < and >, so the criterion >N applied to a last-name field would identify everyone whose surname begins with A–M.

It is not possible to define formats for Filmastr reports and store them for future use. Instead, you must specify which fields you want, and in which order, whenever you require printed output. This is true of video displays, as well. In fact, if you preview a report on the screen, you must go through the definition cycle again to get the printout.

It's not hard to do, though. A few simple codes format the listing. You can print fields in an entirely different order from that in which they appear in the file itself.

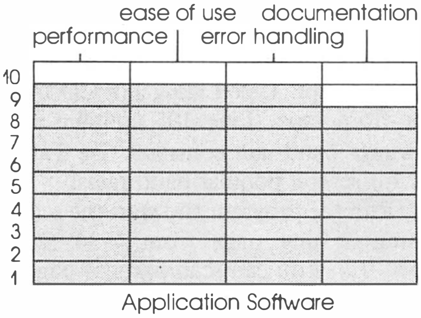
Unfortunately, the space available for format codes is limited, so it isn't practical to set up elaborate headings for Filmastr reports. There are no facilities for pagination or for printing the sum of a numerical data field.

Despite these limitations, and despite the editing problem I referred to earlier, Filmastr can be quite useful for informal data management. It is largely self-prompting, so the manual soon becomes a back-up reference document (although I'd like to see some of its rough spots eliminated).

> *"The ability to sort records is an important aspect of database management, and Filmastr is versatile in this regard."*

The fact that you don't need to identify different types of fields—numbers, strings, dates, and so on—when defining the structure of a file makes life considerably easier for the casual user.

Filmastr protects data rather well, too. Since it disables the break, clear, and enter keys and uses them for control functions at various points in the program, there is no apparent way to lose a file, short of pressing the reset button. That sort of security can be just as precious to the novice as it is to the professional with a large, complex database to worry about. ■



## Micro Compac
**Tandy/Radio Shack**
**Cat. No. 26-3350**
**MC-10, modem**
**$29.95**

**by John S. Cullings**

The Micro Compac is probably the smallest and the least expensive color Videotex communication package available today. And the price includes an introductory membership to CompuServe Information Services (CIS) along with the software—not a bad deal.

| BAUD | ADDR 16931 | ADDR 16932 |
|---|---|---|
| 110 | 2 | 163 |
| 300 | 0 | 241 |
| 600 | 0 | 118 |
| 1,200 | 0 | 57 |
| 2,400 | 0 | 26 |
| 4,800 | 0 | 10 |
| 9,600 | 0 | 2** |

**This baud rate may not function for all 9,600-baud systems

*Table 1. MC-10 Baud Rates*

| ADDRESS | MC-10 FUNCTION |
|---|---|
| 147 | Basic start MSB |
| 149 | Variables start MSB |
| 16932 | Baud-rate LSB |
| 17025 | Cursor LSB |
| 17232 | Start of MC Compac |
| 17306 | 20K top of RAM pointer |
| 19341 | Start of patch |
| 19360 | End of patch |
| 19440 | End of Micro Compac |
| 19456 | Start of text buffer |
| 19525 | Relocated start of Basic |
| 20479 | End of 4K text buffer |
| 36863 | End of 20K text buffer |
| 63306 | Cold start to Basic |

*Table 2. Important addresses used in this review*

You also get a well-written and illustrated 11-page manual that shows typical interconnection diagrams and a sample startup session. Although it assumes you will use a Radio Shack Modem I or Modem II, I used an acoustic-coupled modem with no problems.

### Getting Started

The multifunction startup menu could be confusing to a beginner. However, each function's default values are set to be correct for most dial-in services. Even though the manual tells you to unplug the cassette recorder from the MC-10 after you log on to the bulletin board service (BBS), I found that unnecessary.

You can select several communication parameters before you make a call. You have the following options: 110-, 300-, and 1,200-baud data rates; full or half duplex; 7- or 8-bit word lengths; automatic line feed; and an upper- and lowercase mode.

```
5 REM MICRO COMPAC MODIFICATION
10 REM POKE 147,76 & POKE 149,76
15 REM before TYPING OR LOADING!
20 IF PEEK(147)=76 THEN 30
25 SOUND 66,66: EXEC 63306: KILL
30 FOR I=19341 TO 19360
35 READ D: POKE I,D
40 NEXT I: END
45 DATA 081,038,243,206,000
50 DATA 128,111,000,008,140
55 DATA 001,000,038,248,254
60 DATA 066,080,126,247,101
```

*Program Listing 1. Compac Patch*

### Backspace and Escape

The manual doesn't mention the backspace function, although you can backspace to correct an on-line typing error. Simply press break and @ simultaneously. You can use control/H for a backspace, but not control/A. Pressing break and the colon keys at the same time will send an escape character.

### Text Buffer

You also get a buffer-examine mode for reviewing text that has scrolled off the screen. The size of the text buffer depends upon the size of the machine. A 4K MC-10 has a buffer size of two pages (two screens of 512 characters each), while a 20K MC-10 holds 34 pages. It takes about 10 minutes of continuous data at 300 baud to fill a 34-page buffer.

The Micro Compac won't recognize any memory sizes except 4K and 20K. If you have an 8K MC-10, POKE 17306,96 before executing the program.

You can scroll the text buffer forward or backward—but only in full-page increments. Although this makes reading more difficult, you can search the pages more rapidly.

### Printing

You can print all or part of the text buffer, and this is one of its most useful functions. However, Micro Compac doesn't offer a printer option.

Getting a printout of the Micro Compac text buffer requires the following:

- Disconnect the modem and connect the printer. This is most easily done with a switch box.
- The program will not let you return to Basic, and if you force a Basic cold start, you'll lose all buffer memory. The machine-language patch in Program Listing 1 solves this. I've replaced the scroll-up function with a quit function to perform a partial cold start to Basic.
- You need a suitable scrolling/printing program. Program Listing 2 does this, and it scrolls through the buffer pages at about 420 baud.

To patch a printer function to Micro Compac use these steps:

- CLOADM the original program.
- POKE 19525,0: POKE 147,76: POKE 149,76.
- Type or CLOAD Listing 1.
- Run the Basic program to make the patch.
- If you CSAVEM at this point, you can eliminate steps 2, 3, and 4 in future sessions.

Once you've installed and executed the patch, all functions should perform as before. When you are ready to print, press break and the equal-sign keys to enter the buffer-examine mode. Pressing Z scans the buffer one page at a time. The patch eliminates the W function (reverse scan). To return to Basic for printing, press Q (quit).

> *"Micro Compac offers a very useful function for the MC-10."*

Enter the printing program after the OK prompt. Type Listing 2 or CLOAD it from tape. Line 105 contains the printer baud-rate constant. See Table 1 for several popular baud rates.

Run the program and start the scanning at any page from 1–34 (20K MC-10). You can scan parts of pages. While running, the program has the following five options:

- P—identify current page and prompt for new page,
- ←—shift printout one column left,
- →—shift printout one column right,
- B—mark beginning of print area (press when the first print line is at the top of screen), and
- E—mark end of print area (press when the last print line is at the top of screen).

After pressing E, the program will prompt with "Printer set?". Connect the printer, turn it on, load the paper, and press enter. When you've finished printing, the program will prompt with "Resume?". Press enter again to resume scanning.

```
5 REM COMPAC SCAN/PRINT ROUTINE
10 CLEAR 100,19456
15 CURS=17025
20 INPUT "PAGE (1-34)";P
25 S=P*512+18944
30 M=PEEK(S)
35 IF M<32 THEN M=M+64
40 IF M=128 THEN M=32
45 PRINT CHR$(M);:S=S+1
50 K$=INKEY$: IF K$=""THEN 30
55 C=PEEK(CURS):C=C-32*INT(C/32)
60 IFK$="B"THENB=S-C-480:GOTO30
65 IFK$="E"THENE=S-C-448:GOTO100
70 IF K$=CHR$(8) THEN S=S+1
75 IF K$=CHR$(9) THEN S=S-1
80 IF K$="P" THEN 90
85 SOUND 66,1: GOTO 30
90 C=INT((S-18944)/512)
95 PRINT:PRINT"PAGE ";C: GOTO 20
100 PRINT:INPUT"PRINTER SET";I$
105 J=0: POKE 16932,118:REM baud
110 FOR I=B TO E-1: M=PEEK(I)
115 IF M<32 THEN M=M+64
120 IF M=128 THEN M=32
125 LPRINT CHR$ (M);
130 J=J+1:IF J=32THEN LPRINT:J=0
135 NEXT I: LPRINT: PRINT:PRINT
140 INPUT"RESUME";I$:S=E:GOTO 30
```

*Program Listing 2. Scan and Print*

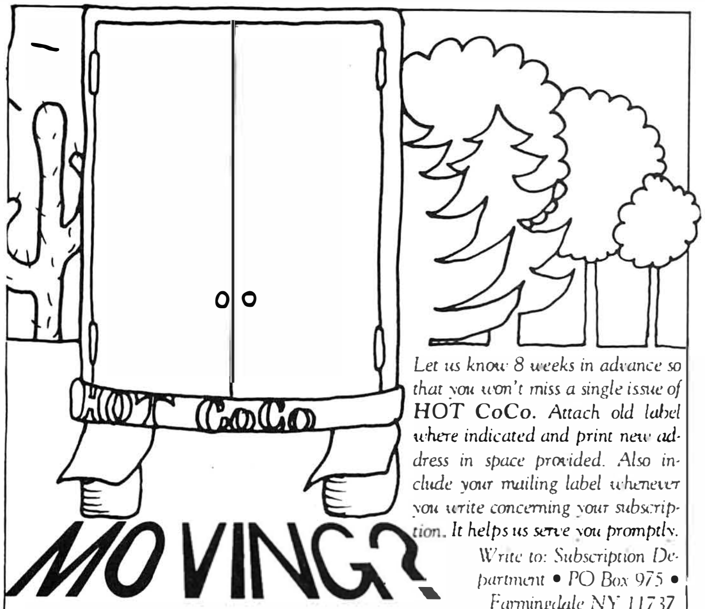
The printing will be 32-columns-per-line, exactly like the screen display. The printer patch overwrites (destroys) part of the original communication program. To return to the communication mode, type and enter EXEC 63306, CLOADM Micro Compac, and type EXEC.

### CSAVEM

The MC-10 does not have a CSAVEM function to save a machine-language program to tape, but you can make a backup of Micro Compac by any of the following ways:

- Use an Extended Color Basic Color Computer and type CSAVEM "COMPAC",17232,19440,17232.
- Use the Humbug monitor program (Star-Kits, P.O. Box 209-H, Mt. Kisco, NY 10549, $29.95, cassette) MCH7500 in a 20K MC-10. Enter SA 4350 4BF0 4350 COMPAC.
- Use Program Listing 3 on page 69 of the September 1983 *HOT CoCo*. Before CLOADing, enter POKE 19525,0: POKE147,76: POKE149,76. (STRT = 17232 END = 19440 EXEC = 17232 NAME = COMPAC).

Micro Compac offers a very useful function for the MC-10. Unless you must upload and download files, it should suit your needs. Given the MC-10's limited potential, this might be the best communication program the little CoCo will ever see. ■



*Let us know 8 weeks in advance so that you won't miss a single issue of HOT CoCo. Attach old label where indicated and print new address in space provided. Also include your mailing label whenever you write concerning your subscription. It helps us serve you promptly.*

*Write to: Subscription Department • PO Box 975 • Farmingdale NY 11737.*

*☐ Extend my subscription one additional year for only $24.97.*

*☐ Payment Enclosed ☐ Bill Me*

*Canada & Mexico $27.97/1 yr. only US funds drawn on US bank.*
*Foreign surface $44.97/1 yr. only US funds drawn on US bank.*

| *affix old label* | *new address* |
|---|---|
| *name* ________ | *name* ________ |
| *address* ________ | *address* ________ |
| *city* ____ *state* ____ *zip* ____ | *city* ____ *state* ____ *zip* ____ |

*HOT CoCo • PO Box 975 • Farmingdale NY 11737*

---

# HOT CoCo

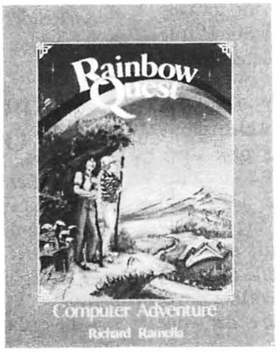
# Reader Service

**TO RECEIVE MORE INFORMATION ON THE PRODUCTS AND SERVICES ADVERTISED IN THIS ISSUE, PLEASE TURN TO READER SERVICE CARD.**

---

# Fiction, Fantasy, and Computer Adventure For the Color Computer

**Rainbow Quest** will take your child on a space adventure of the future. The planet Rainbow is a faraway land of events for young readers to discover. **Rainbow Quest** is a book-and-software adventure for the **Color Computer.** Children read and play along as Molly and Sam meet strange creatures as they make their way across the planet Rainbow. To reach their goal, they must survive on their own and face the challenges they meet. Readers will help Molly and Sam find their way through dark and confusing mazes, solve word and number puzzles, and conquer invaders in arcade-style games. Each obstacle they meet is a program, on the **Rainbow Quest** cassette, ready to load and run.



**Rainbow Quest** has 25 programs in all. Book and software are sold together in a protective storage binder with complete instructions. Each **Rainbow Quest** package for the **Color Computer** is $24.95.

To order **Rainbow Quest**, call toll-free for credit card orders, 1-800-258-5473. (In New Hampshire, call 924-9471.) Or mail your order with payment or complete credit card information to: **Wayne Green Inc., Book Sales, Peterborough, NH 03458.** Include $2.00 per package for shipping and handling. Orders payable in U.S. dollars only.

**Rainbow Quest** by Richard Ramella.
Illustrated by Coni Porter.
BK7391 ISBN 0-88006-064-6.
Wayne Green Books are available at your local bookstore. Dealer inquiries invited.

✓331

Color my child's imagination! Send me ______ **Rainbow Quest** packages for the Color Computer (BK7391) at $24.95 each. (Include $2.00 per package for shipping and handling.)

☐ Payment Enclosed ☐ MasterCard ☐ VISA ☐ AMEX

Card # ________________ Exp. date ________

Name ________________ Signature ________________

Address ________________________________

City ________________ State ______ Zip ______

Wayne Green Books, Peterborough, NH 03458 **346B4Q**

# PRODUCT NEWS

*edited by Cynthia Smith*

Information used in the Product News section is supplied through manufacturers' press releases. *HOT CoCo* has not tested or reviewed these products and cannot guarantee any manufacturer's claim.

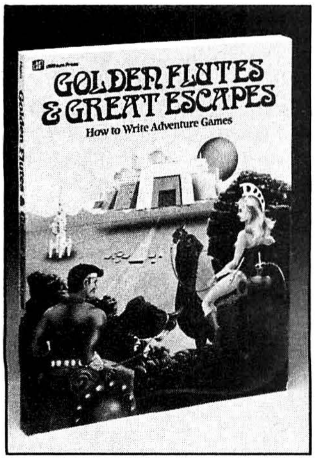
## Write An Adventure

When you have played enough video games to know you could write a better one, there is help in this new book by Delton T. Horn. *Golden Flutes and Great Escapes: How to Write Adventure Games* describes the process of designing and coding programs, and gives fundamental rules of creating original, interactive adventure games. It gives four game programs with explanations of how they work.

It is helpful to be familiar with Basic programming, but you don't have to be a computer whiz to enjoy the programs. Chapters include Creating a Plot, Marketing Your Software, Complicating the Program, and many others.

Look for it in bookstores or contact Dilithium Press, 8285 S.W. Nimbus, Suite 151, Beaverton, OR 97005. 800-547-1842.

*Reader Service ✓ 557*



*Create Your Own Adventure Games*

## Computerware's Latest Line-Up

Computerware has introduced the following products for the Color Computer:

**Advanced Editor** on OS-9 disk is a comprehensive editor that automatically loads O-Pak hi-res files for full screen display. It has 41 commands using conventional syntax, global search, find, and change commands, and 21 line-editing commands.

This editor doesn't require that you count lines and characters to find or move the pointer, and you can edit files larger than memory. It requires OS-9, and sells for $39.95 plus $2 shipping.

**The Sourcerer** on OS-9 disk is a menu driven, symbolic 6809 disassembler that produces symbolic source code that can be assembled. It includes:

- Automatic equate generation for labels and symbols outside of disassembly range
- FCC, FCB, and FDB generation
- It is written in 6809 machine language for speed
- Position-independent code is relocatable to any area of memory
- It produces files with or without line numbers, and can produce symbolic labels for all extended addresses.

The Sourcerer costs $39.95 plus $2 shipping, and requires OS-9.

**Disk Fix and other OS-9 Utilities** lets the OS-9 use disk drives to the fullest potential. It supports true double-sided/double-density drives, 40 tracks, and step rates of up to 6ms. All necessary patches or new software are included for formatting, reading, and writing true double-sided/double-density disks with up to 40 tracks.

Included with the OS-9 Disk Fix package is DMODE, which allows modification of your disk drive descriptors. DIRCOPY includes copying of complete disks with one command, copying of any subdirectory, automatic overwrite of command, automatic overwrite of existing files, and sorting directories in alphanumeric order while copying and replacing outdated files with current ones.

The utility package also includes Patch, a program for inspecting and modifying any disk-based file. Filelook displays file modules without loading them into memory, and Compare compares a disk file with memory. This package sells for $29.95 on disk plus $2 shipping, and requires OS-9 disk.

**CoCo Cookbook** is a free-format data-base system designed to store and retrieve a large number of recipes, up to 270 on a single disk. Each recipe can use up to 3,040 characters, including title, ingredients, and instructions, and can be accessed by title, number, or a special keyword search. The recipes can be listed on the screen or printer. It sells for $27.95 plus $2 shipping, and requires 32K and a single disk drive.

**Basic Programming Utilities and Print Spooler** includes the following:

- Sprint—this printer spooler sets up a printer buffer in upper memory so you can print while other computer operations continue unaffected.
- BASREF—this utility prints a complete variable and line number cross-reference list for Basic programs.
- VDump—the values of all the variables in your Basic program are printed in this utility.
- CCExpand—if you have 64K you can use this combo of the Sprint utility with a 51-by-24 hi-res screen, a 25K printer buffer, and use only 287 bytes of user memory.
- FIXDIR—this is a disk-only utility that helps you clean up Basic's disk directory.

The package sells for $19.95 on cassette or $24.95 on disk plus $2 shipping.

For information on any of these products, contact Computerware, Box 668, 4403 Manchester Ave., Suite 102, Encinitas, CA 92024. 619-436-3512.

*Reader Service ✓ 563*

## Microcomputing Overseer

The *Microindex* journal is a comprehensive index to microcomputing-oriented periodicals, including *HOT CoCo*. It is for all ages, disciplines, and levels of expertise.

Article data includes title, author, page, length, journal, issue, reader level, and rating. Article types include all features, articles, product reviews and announcements, and significant letters and notes. Tabulation is for easy referencing in levels by microcomputer model, and general and specific topics such as elementary education, and accounting.

*Microindex* is available in the following versions:

- Microindex—a monthly issue for large libraries, universities, and businesses; $99 yearly, $12 per issue.
- Abridged *Microindex*—monthly issue for medium-sized libraries, colleges, high schools, academies, computer dealers, and small businesses; $49 yearly, $6 per issue.
- Journal-specific, end-of-volume *Microindex*—for individual readers, small libraries, schools, and businesses. The Microindex to *HOT CoCo*, Vol I, will be available after July 1984 for $7. Prices range from $5 per year, to $12 per issue.
- Other variations such as complete one-volume annuals and monthlies, or annuals based on topics such as education, business, Radio Shack computers, IBM, or Apple, will be announced as they become available, or on specific demand.

For more information contact Serious Personal Computing, P.O. Box 7059, South Nashua, NH 03060. 603-888-1376.

*Reader Service ✓ 559*

## Deluxe Leapfrog

Can you hop your frog home? Your first challenge is to maneuver him across a busy highway loaded with speeding cars, trucks, and tractors. Beware of snakes slithering along the middle. Hop your frog on crocodiles, 3-D logs, and diving ladybugs as you cross the river. Pick up the lady frog and munch on a fly for bonus points.

Deluxe Leapfrog features realistic graphics and a unique sound system. Put a cassette with music into your recorder or plug the black jack into a radio, and the game plays your favorite music in the background.

This game is for one or two players and has both high score and reset features. It is available on 16K cassette for $21.95 plus $2 shipping. Contact Photographics Software, 114-41 Queens Blvd., Forest Hills, NY 11375.

*Reader Service ✓ 561*

## Cold Duck?

Ice Bird is a new strategy arcade game from Crystal Software. In it you become a penguin in a maze of ice blocks. Ice Bird can push or shatter these blocks with ease and must connect three diamond blocks without getting stung.

There are over a dozen maze levels and the game uses high-resolution, animated graphics for the 16K CoCo. Joysticks are required for one or two players. Ice Bird sells for $28.95 (disk) and $24.95 (cassette) plus $1.50 for shipping.

Contact Crystal Software, 6591 Dawsey Road, Rock Creek, OH 44804. 216-474-7626.

*Reader Service ✓ 562*

## Definitive Reference

*The TRS-80 User's Encyclopedia (Color Computer and MC-10)* is a definitive reference book for your Radio Shack Color Computer. It will save you time by bringing material from many sources into an alphabetical reference handbook.

*The User's Encyclopedia* guides you through machine operation, Basic programming, and what's available in software and hardware. Entries are short and clear, and cross-referencing points you to related items. It also contains names and addresses of software and hardware manufacturers listed alphabetically in the vendor's list at the end of the book.

You will find accurate, up-to-date descriptions or reviews of products, and just about everything else you need to know about your CoCo. Written by Gary Phillips and *HOT CoCo*'s Technical Editor Guier S. Wright, *The TRS-80 User's Encyclopedia (Color Computer and MC-10)* is published by The Book Company, 294 Donahue St., Sausalito, CA 94965. 415-331-2395.

*Reader Service ✓ 558*

## Corect Mispelings

Spell 'N Fix Level II is a spelling and typographical correction program that builds on Star-Kits' Spell 'N Fix. This program splits the screen into two windows. The top window shows the text in upper- and lowercase as it is being read; the bottom window displays program status, misspelled words, and possible alternative spellings.

Spell 'N Fix Level II has a 20,000-word dictionary; you can add up to 20,000 additional words or use alternative dictionaries. Each time the program encounters an unknown word in the text being proofread, it lets you add it to the dictionary or correct it.

When correcting a word, Spell 'N Fix Level II lets you browse through the computerized dictionary to find the appropriate spelling or a replacement word. Once a word is corrected, the program remembers the old and new words, and will suggest the correct spelling if the bad word is encountered again.

The program is fully self-prompting and has extensive error-recovery routines. It requires 32K or more and at least one disk, includes an operating manual, and costs $69.29. Order through a dealer or contact Star-Kits Software Systems Corp., P.O. Box 209, Mt. Kisco, NY 10549. 914-241-0287.

*Reader Service ✓ 556*

## Oak Furnishings For Decorator CoCos

If you're tired of putty beige, reinforced steel, chrome, and smoked plexiglass computer work stations and desks, then A.J. Hilliard Inc. is manufacturing your answer. Their line of solid oak and oak veneer office/computer furniture is traditionally styled and suitable for office or home.

Larger pieces are shipped knocked down in two or more boxes and you will need a screwdriver and tack hammer to assemble them. Prices vary up to $349. For more information contact A.J. Hilliard Inc., 11814 Coursey Blvd., Suite 425, Baton Rouge, LA 70816. 504-927-0270.

*Reader Service ✓ 553*

*Model 800 Desk with Bookcase.*

*Model 550 Desk*

## Sugar for Your CoCo?

Sugar Software has two new products for the Color Computer.

The Semigraf graphics editor has high-resolution graphics for projects such as program title screens, and slide presentations. You can combine text with graphics to make a computer book.

The editor is menu driven, has auto-repeat, letter set, sample pictures, and Sugar Software's magic-delete feature. Semigraf requires 16K and comes on disk ($24.95), or tape, which includes Extended and non-Extended version ($19.95).

Bible Stories Adventure is designed for the family. It uses five well-known Old Testament stories in which you are the hero. Among the adventures—lead the Israelites across the Red Sea, and slay Goliath. It requires 16K Extended Color Basic and is available on tape for $19.95 and disk for $24.95.

Contact Sugar Software, 2153 Leah Lane, Reynoldsburg, OH 43068. 614-861-0565.

*Reader Service ✓ 554*

## Moses's Latest

Moses Engineering has announced a new line of programs for the Color Computer and the MC-10. They include Introduction to Solar Energy and Introduction to Computer Math, both for the CoCo, and The Nuclear Survival Program for the MC-10 and the CoCo.

All programs are available for $7 per cassette. For more information and a free catalog, write Moses Engineering, Box 11038, Huntsville, AL 35805.

*Reader Service ✓ 551*

## Pharaoh's Secret

Tut's Tomb, a high-resolution arcade game from Mark Data, takes you through the ancient maze of Pharaoh's tomb. You fight dangerous creatures at every turn as you find keys that lead to the ultimate treasure.

This 16-screen epic comes on 32K cassette for $24.95, and 32K disk for $27.95. Contact Mark Data Products, 24001 Alicia Parkway, No. 207, Mission Viejo, CA 92691. 714-768-1551.

*Reader Service ✓ 555*

## Elite-File

A relational data-base manager with all the editing and report-formatting features found on large computer systems is now available for the Color Computer.

Elite-File is a machine-language program that allows you to define your own data record structures and reformat them without restructuring the entire data base. Elite-File can handle up to 2,000 characters per second, 4,000 records per file, 16 files open at the same time, 255 characters per field name, and up to 255 named fields per record.

The program is menu-driven, uses single key commands, and there can be up to eight fields in the primary key. Subfield definitions can be nested and record definitions copied from file to file.

You can edit records with a full screen type-over editor and copy them when identical data is to be repeated. You can sort records in ascending or descending order by any field and select them by field content with full logic combination capabilities.

The user can set print formats and place data by field name anywhere on the printed page, and send it to the screen (with format capabilities) or save it as an ASCII file.

Data files are also accessible from multiple drives. The program is memory resident with no program overlays from disk. Elite-File is compatible with Elite-Calc and Elite-Word. You can load both spreadsheets and ASCII file address lists into random-access data files.

Elite-File is available on disk only for 32K and Disk Basic for $74.50 plus $2 shipping. Contact Elite Software, Box 11224, Pittsburgh, PA 15238.

*Reader Service ✓ 550*

Young Horizons SOFTWARE

**15⁹⁵ TITAN MISSION**
16K, 1 Player, Cassette
Shoot at mines circling Titan to unleash alien cruisers intent on destroying your fleet of surface rovers. Your mission, destroy the enemy menace and free mankind to continue its exploration of space.

**15⁹⁵ HANGMAN**
16K, 1 Player, Cassette
The old favorite spelling game comes to life on the screen. Complete with western graphics and word choice. Great spelling aid.

**15⁹⁵ RAT RACE**
16K, 2 players, Joysticks required, Cassette
Change from the cat to the mouse in your race for the cheese. It's one on one against family and friends.

**15⁹⁵ SUBDESTROYER**
16K, 1 Player, Cassette
Race against time and pilot your ship into the proper position to drop depth charges on enemy submarines. Increase your ranking from "Dinghy Pilot" to "Commander in Chief".

**15⁹⁵ GOPHER**
16K, 1 Player, Cassette
Help the gopher get vegetables from the farmer's garden by manuvering through tunnels. Avoid the farmer and foxes in your quest for dinner.

**12⁹⁵ CONCENTRATION**
*NEW!* 16K, 1 Player, Cassette
Memory is the name of the game in this match game. The sharper memory controls. Fun for adults and children.

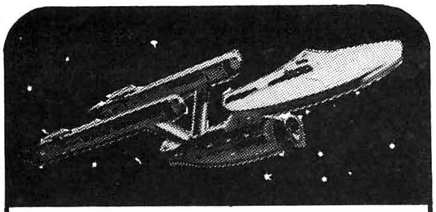
**12⁹⁵ DODGE 'EM**
*NEW!* 16K, 2 Players, Joysticks required, Cassette
Avoid your opponent's traps and set him up in yours in this highly competitive one on one struggle for survival.

***Send check, money order, Master Card or VISA along with $1.50 shipping and handling to:***

**YOUNG HORIZONS SOFTWARE**
**215 Bellaire Ave.**
**Dayton, Ohio 45420** ✓111

*Ohio residents add 6% sales tax.*

If you have any questions concerning your CoCo, send them to us, we'll be glad to assist you.



**COLOR TREK** — Blast Klingons and save the Federation in this game of both skill and strategy. Includes an instructions program and ten levels of difficulty. Requires 16K of memory.
Cassette $7.95

**ADVANCED D&D NON-PLAYER CHARACTER MAKER** — Takes into account spells, weapons, hit points, level, class, gender, race, alignment, constitution bonus, racial adjustments, and minimum requirements. Whew! A must for all dice weary DM's. Requires 16K of memory.
Cassette $14.95

**ARE YOU BORED WITH YOUR 4K COLOR COMPUTER?**

**COLOR ALEPH PROGRAM PACKAGE** — Includes COLOR CYCLES, COLOR BLACKOUT, and COLOR MAZE. Each is progressively difficult and requires only 4K of memory.
Cassette $11.95

**COLOR CYCLES** — Play chicken against motorcycles of light with up to seven enemies at one time. Written in machine language.
Cassette $4.95

**COLOR BLACKOUT** — Armed with only a tennis racquet and five balls, you must knock out the colored bars piece by piece. Joysticks are required.
Cassette $4.95

**COLOR MAZE** — Run for your life through a twisty maze. All the while, an angry ghost is chasing at your heels throwing paralysis rays. Be wary of the meddlesome programming wizard who rearranges the maze around you. Includes machine language subroutines.
Cassette $4.95

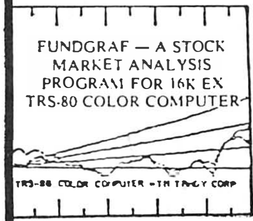
Aleph Unlimited
P. O. Box 8007
Stockton, California 95204 ✓60

# STOCK & FUND INVESTING

**FUNDGRAF** is a stock market analysis program that not only graphs and analyzes funds or stocks, but also makes decisions on when to BUY and SELL.

- GRAPHS fund's progress (up to 200 wks).
- SUPERIMPOSES for comparison:
  - a line of constant percent growth.
  - a graph of any other fund (or stock).
- CALCULATES over any given time span:
  - the percent price change.
  - the moving average (any span).
- INDICATES BUY and SELL signals.

**FUNDFILE** is a portfolio and account management program for securities. It creates files for up to 900 transactions & 50 securities and reports asset value, realized & unrealized capital gains, adjusted costs (for stock dividends), and MORE!!


FUNDGRAF — A STOCK MARKET ANALYSIS PROGRAM FOR 16K EX TRS-80 COLOR COMPUTER
TRS-80 COLOR COMPUTER -TM TANDY CORP

**- FUNDGRAF -**
TAPE @ $49.95
DISK @ $69.95
**- FUNDFILE -**
DISK only @ $27.95

- ADD $2 Handling on all orders.
- Details? SEND SASE
- 16 K ECB Requir'd.
- printer optional

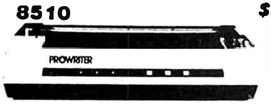
PARSONS SOFTWARE, DEPT.E
118 WOODSHIRE DRIVE
PARKERSBURG, WV 26101 ✓320

***HARDWARE FOR YOUR CO-CO***

***KEYBOARDS***
***HJL*** ***MICRONIX***

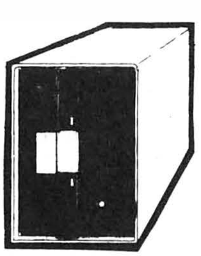
***$79.95***

*C. Itoh Prowriter*
**8510** ***$399.***



**WICO**
***Atari to CO-CO Adapter $17.95***

***DRIVE 0 $379.***
***DRIVE 1 $229.***



**TANDON DISK DRIVES**

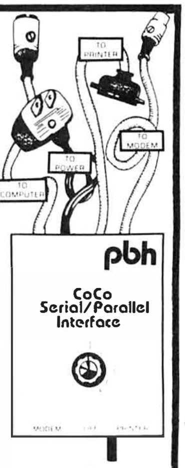
Perfect for replacement or add on drive for any 5" drive system.

| | |
|---|---|
| TM100-1 40 Track Single Sided | $179. |
| TM100-2 40 Track Double Sided | $279. |
| TM50-1 6ms trk-trk Single Sided Thinline | $169. |
| TM50-2 6ms trk-trk Double Sided Thinline | $219. |
| Single case with extenders with drive above | $49.95 |
| Dual case with extenders for drives above | $79.95 |
| Two Drive Cable | $24.95 |

a Serial/Parallel Interface for the **Radio Shack™** Color Computer. Our Interface allows your **CoCo** to connect with most, currently manufactured printers and offers such features as

- ☐ Switch selectable baud rates from 300 to 9600
- ☐ Switch selectable printer or modem operations
- ☐ Elimination of recableing. It comes cabled with standard **"DIN"** connectors for **CoCo** and Modem. Also **"Centronics"** standard 36 pin connector for printers
- ☐ Self contained Power Supply and Cord

**Radio Shack™** is a registered trademark of **Tandy Corp.**



***$89.95***

**64K COCO KIT $62.95**

***PBH CORDLESS JOYSTICK***

☆☆☆☆☆☆☆

***$99.***

***COMING SOON***

***NEW!***
PBH JOYSTICK
***$49.95***
***ONLY THE FIRE BUTTON MOVES!***

*Verbatim Datalife*
**SS/DD** ***$25.95***

Datalife
minidisks
Verbatim

✓455

**COMPUKIT** *CORPORATION*

**orderline**
**1-800-231-6671**

**local orders and shipping info**
**1-713-480-6000**

16206D Hickory Knoll Houston, Texas 77059

**You've invested a lot of time and money into your computer . . . . .**

*It's time that investment paid off!*

# THE COLOR ACCOUNTANT

Introducing The Color Accountant (from The Programmer's Institute), the only complete personal financial package specifically designed for the TRS-80 Color Computer. This unique package includes:

1. **Complete Checkbook Maintenance**
2. **Chart of Accounts Maintenance**
3. **Income/Expense Accounts**
4. **Net Worth Statement**
5. **Payments/Appointments Calendar**
6. **Color Graph Design Package (graphs any files)**
7. **Check Search**
8. **Home Budget Analysis**
9. **Decision Maker**
10. **Mailing List**

After the initial setup, **THE COLOR ACCOUNTANT** requires less than an hour of data input each month.

The checkbook maintenance program is the key to the entire package. Once your checkbook is balanced, the checkbook summary file will automatically update the home budget analysis, net worth, and income/expense statements. You can then graph any file, record bills and appointments, make decisions, print a mailing list, analyze various accounts or stocks, and even calculate taxes.

All programs are menu-driven and allow add/change/delete. Each file and statement can be listed to screen or printer, and saved to cassette or diskette. **THE COLOR ACCOUNTANT** also comes with 40 pages of documentation that leads you step-by-step through the entire package. The TRS-80 COLOR Ext. Basic requires 16K for this package.

**\$74.95 Cassette** **\$79.95 Diskette**

## Send \$2 For Our New 64-Page Catalog (#11) Which Contains More Than 500 Software Products.

**(Catalog is provided FREE with any order)**

**To Order:**

**Write or call Toll-Free (800) 431-2818**

**(N.Y.S. residents call 914-425-1535)**

**COMPUTRONICS INC.**

**50 NORTH PASCACK ROAD** ✓9

**SPRING VALLEY, N.Y. 10977**

- add \$3 for shipping in UPS areas
- add \$4 for C.O.D. or non-UPS areas
- add \$5 to CANADA or MEXICO
- add proper postage elsewhere

**30-DAY MONEY BACK GUARANTEE**

***** ALL PRICES AND SPECIFICATIONS SUBJECT TO CHANGE *****

**DELIVERY SUBJECT TO AVAILABILITY**

# BUSINESS PAC 100

## *Now Available for the TRS-80 Color Computer!*

**Includes Inventory Control, Payroll, Accounts Receivable, Accounts Payable, Checkbook Maintenance, and more. Comes with 128-page user's manual.**

Interest apportionment by Rule of 78's • Annuity computation program • Time between dates • Day of year a particular date falls on • Interest rate on lease • Breakeven analysis • Straightline depreciation • Sum of the digits depreciation • Declining balance depreciation • Double declining balance depreciation • Cash flow vs. depreciation tables • Print checks with daily register • Checkbook maintenance program • Mortgage amortization table • Compute time needed for money to double, triple, etc. • Determine salvage value of an investment • Rate of return on investment with variable inflows • Rate of return on investment with constant inflows • Effective interest on a loan • Future value of an investment (compound interest) • Present value of a future amount • Amount of payment on a loan • Equal withdrawals from investment to leave zero over • Simple discount analysis • Equivalent & nonequivalent dated values for obligations • Present value of deferred annuities • Percent markup analysis for items • Sinking fund amortization program • Value of a bond • Depletion analysis • Black-Scholes options analysis • Expected return on stock via discounts dividends • Value of a warrant • Estimate of future earnings per share for company • Compute alpha and beta variables for stock • Portfolio selection model • Option writing computations • Value of a right • Expected value analysis • Bayesian decisions • Value of perfect information • Value of additional information • Derive utility function • Linear programming solution by simplex method • Transportation method for linear programming • Economic order quantity inventory model • Single server queueing model • Cost-volume-profit analysis • Conditional profit tables • Opportunity loss tables • Fixed quantity economic order quantity model • Cost-benefit waiting line analysis • Net cash-flow analysis for simple investment • Profitability index of a project • Weighted average cost of capital • True rate on loan with compensating balance required • True rate on discounted loan • Merger analysis computations • Financial ratios for a firm • Net present value of project • Laspeyres price index • Paasche price index • Construct seasonal quantity indices for company • Time series analysis linear trend • Time series analysis moving average trend • Future price estimation with inflation • Mailing list system • Letter writing system (links with mailing list system) • Sort lists of names • Shipping label maker • Name label maker • DOME business bookkeeping system • Compute week's total hours from timeclock info. • In-memory accounts payable system • Generates invoices on screen and print on printer • In-memory inventory control system • Computerized telephone directory • Time use analysis • Use of assignment algorithm for optimal job assignment • In-memory accounts receivable system • Compare 3 methods of repayment of loans • Compute gross pay required for given net • Compute selling price for given after-tax amount • Arbitrage computations • Sinking fund depreciation • Computerized UPS zone table • Type envelope with return address • Automobile expense analysis • Insurance policy file • In-memory payroll system • Dilution analysis • Loan amount a borrower can afford • Purchase price for rental property • Sale-leaseback analysis • Investor's rate of return on convertible bond

## 100 Ready-To-Run Business Programs

**only \$99.95**

(Available on diskette only)

Also available for TRS-80 Models I, II and III, Apple, Atari, Osborne, Kaypro, all Commodore Computers and most CP/M systems.

# SERIOUS SOFTWARE FOR THE SERIOUS USER!

**SUPER SLEUTH** for OS-9 $49.95

Examine, modify or disassemble binary files into source code!

**DYNA-C** for OS-9 $59.95

A Small-C derivative.

**A-BASIC Compiler** OS-9 $75.00

Produce fast, ROMable object code from BASIC source code!

**DYNASOFT PASCAL** OS-9 $59.95

A Pascal subset requiring only 12K of RAM!!

**UTILIX** for OS-9 $49.95

A set of UNIX-like utilities for OS-9!

**O-Pak** for OS-9 $34.95

Hi-Res screen for OS-9

**DYNASTAR/DYNAFORM** OS-9 $90.90
**DYNASPELL** for OS-9 $59.95

Word processing complete with spelling checker!!!

**CRASMB** for OS-9 $399.00 (includes all CPM's)

Cross assemble source code into object code files.!

## SERIOUSLY NOW . . .

**FHL FRANK HOGG LABORATORY**

THE REGENCY TOWER • SUITE 215 • 770 JAMES ST. • SYRACUSE, NY 13203
PHONE (315)474-7856 • TELEX 646740

262

*OS-9 IS A TRADEMARK OF MICROWARE, INC